Red Hat OpenShift

OpenShift Architecture

As Part of OpenShift Architecture Workshop

Self-Service

Multi-language

Automation

Collaboration

Multi-tenant

Standards-based

Web-scale

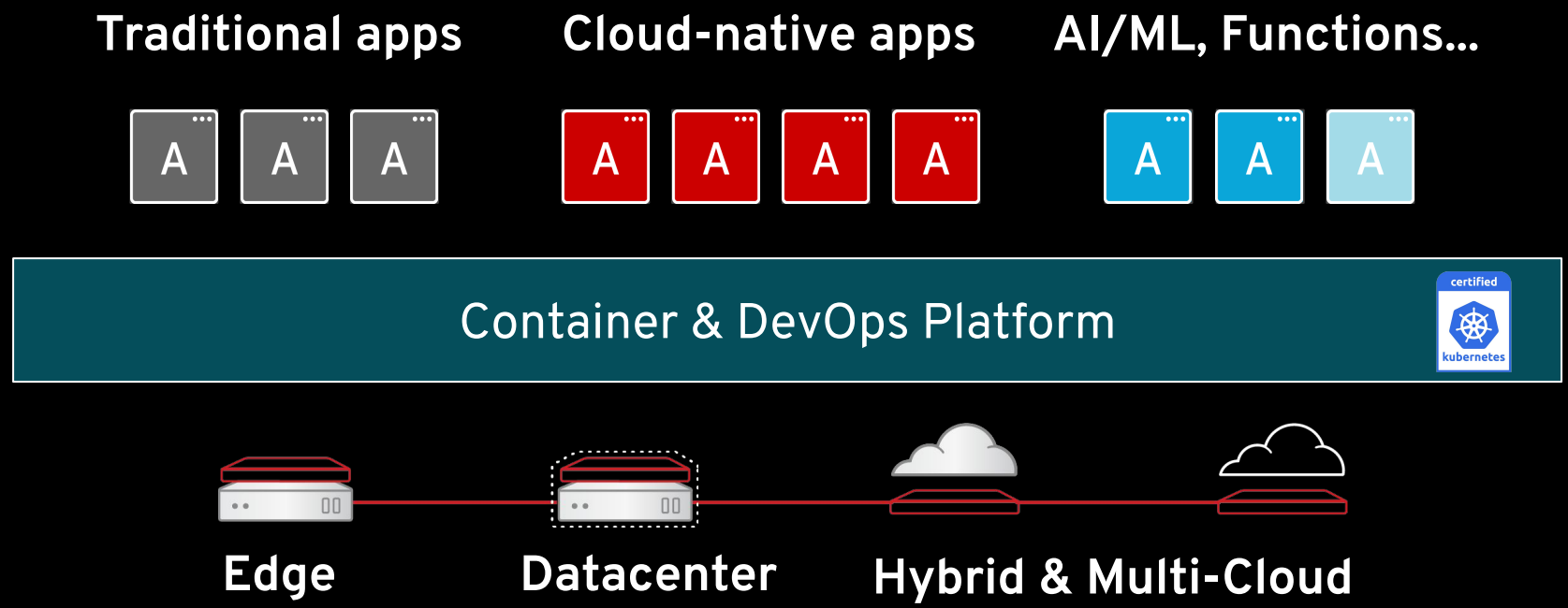
Open Source

Enterprise Grade

Secure

Red Hat

With OpenShift you can deliver all your applications in a whole new way



Red Hat

> We provide a 5-hour head start in treating sepsis. And in the hands of clinicians, 5 hours saves lives.

Dr. Edmund Jackson
VP & Chief Data Scientist
HCA Healthcare

HCA Healthcare
Using data insights to save lives

More than 1,000 Red Hat OpenShift customers

MODERNIZE APPS

WEB APPS

CLOUD NATIVE DEV

MULTI-CLOUD

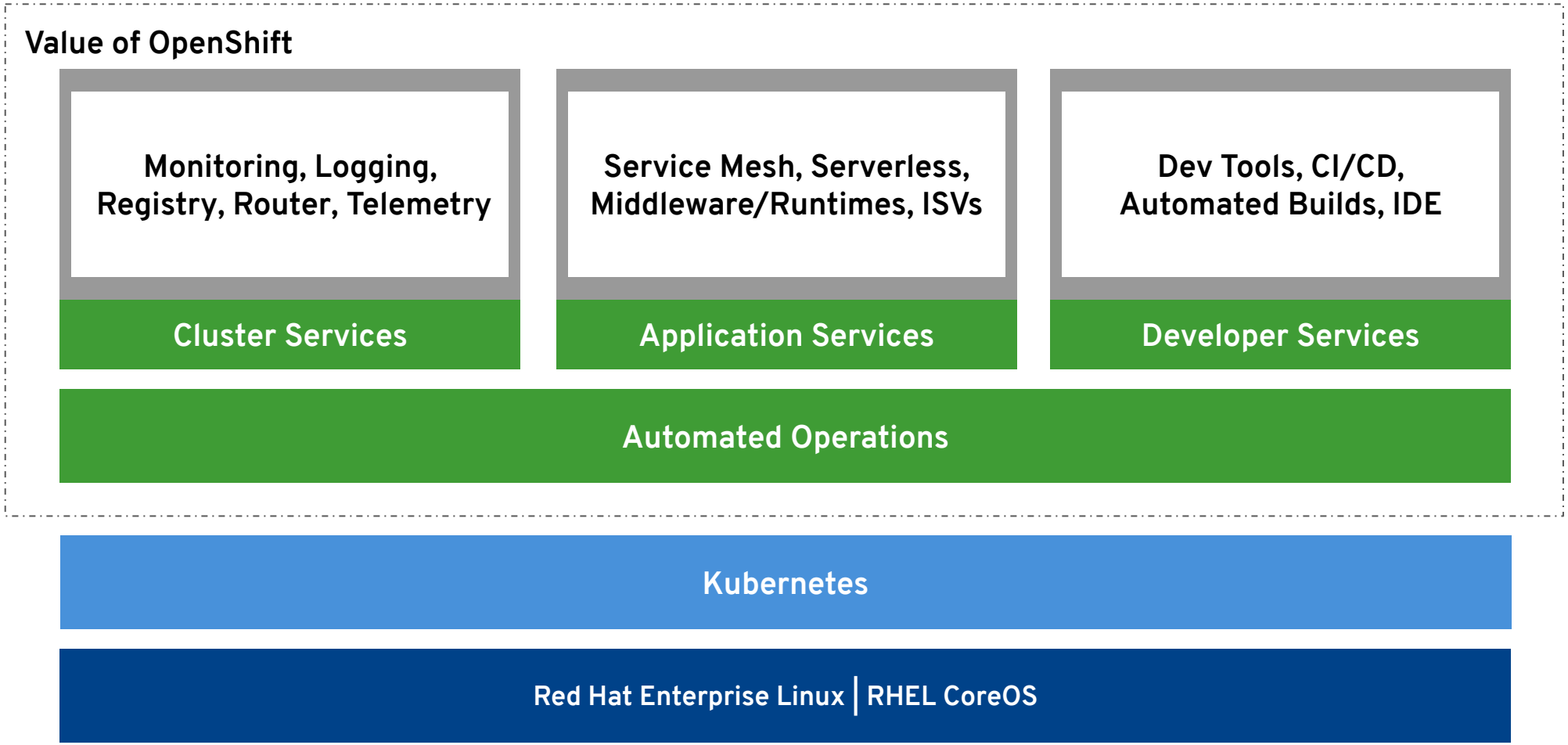
MOBILE

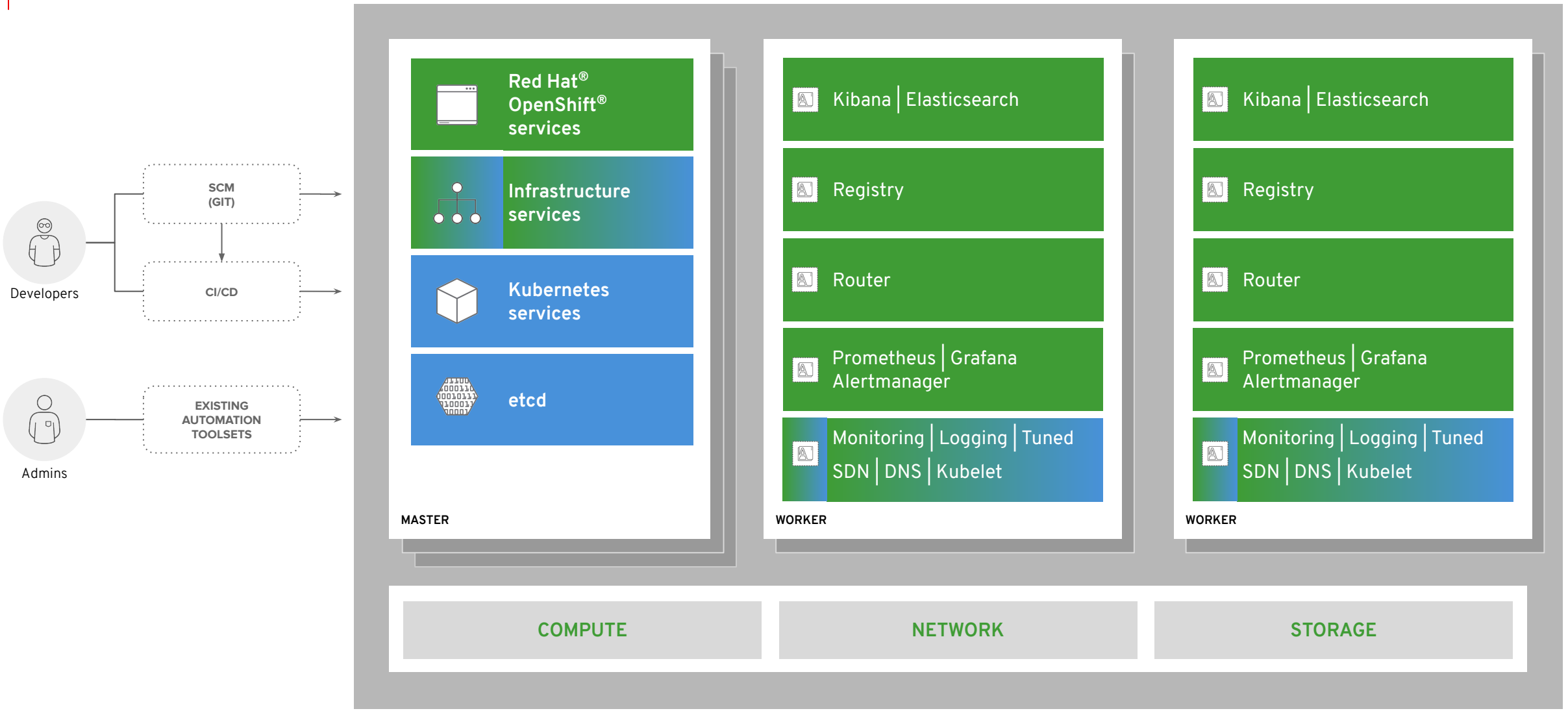
BIG DATA | ANALYTICS

AI | ML

IOT

Red Hat


Value of OpenShift
Monitoring, Logging, Registry, Router, Telemetry
Service Mesh, Serverless, Middleware/Runtimes, ISVs
Dev Tools, CI/CD, Automated Builds, IDE
Cluster Services
Application Services
Developer Services
Automated Operations
Kubernetes
Red Hat Enterprise Linux | RHEL CoreOS
Best IT Ops Experience
CaaS
PaaS
FaaS
Best Developer Experience


SCM (GIT)
CI/CD
Developers
EXISTING AUTOMATION TOOLSETS
Admins
Red Hat® OpenShift® services
Infrastructure services
Kubernetes services
etcd
MASTER
Kibana | Elasticsearch
Registry
Router
Prometheus | Grafana Alertmanager
Monitoring | Logging | Tuned
SDN | DNS | Kubelet
WORKER
Kibana | Elasticsearch
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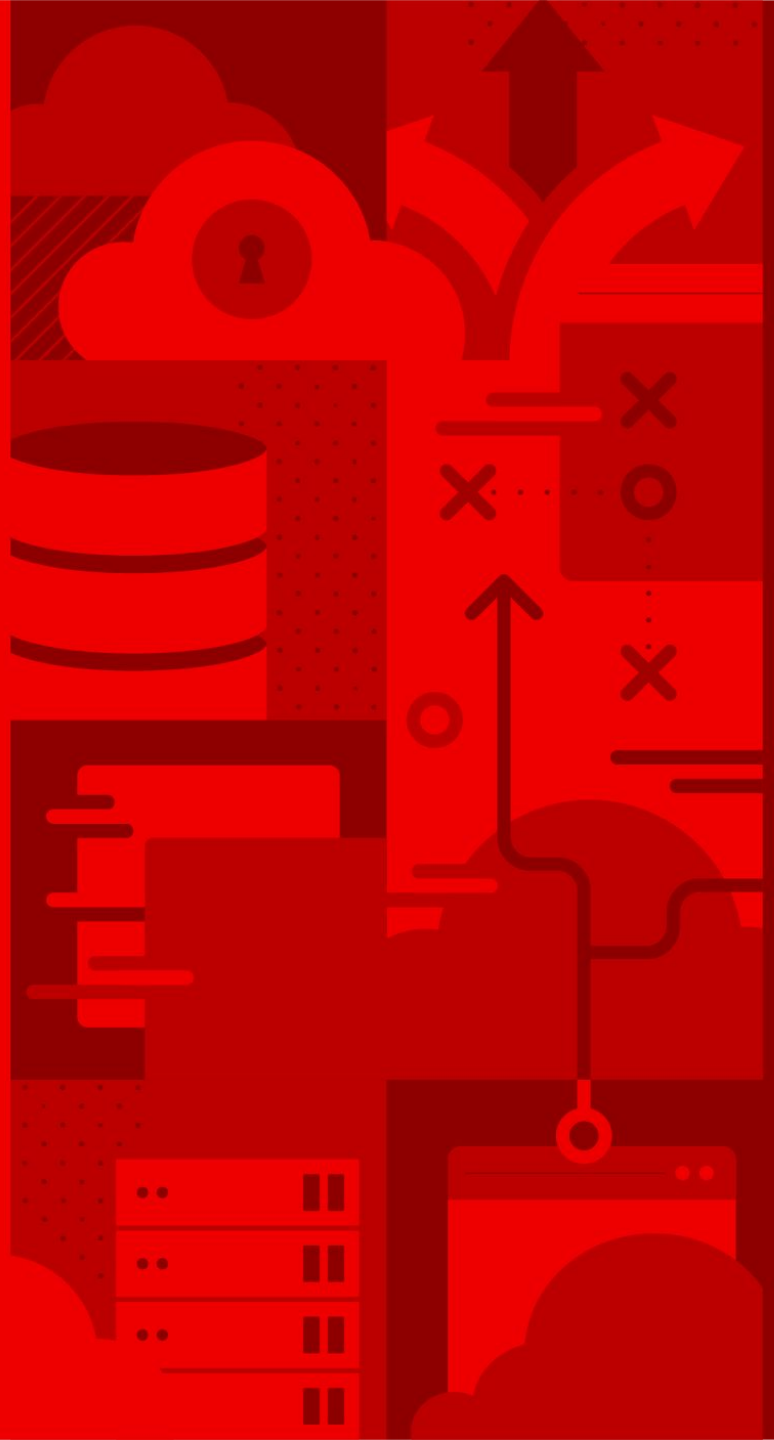
WORKER
COMPUTE
NETWORK
STORAGE

Red Hat



OpenShift and Kubernetes core concepts

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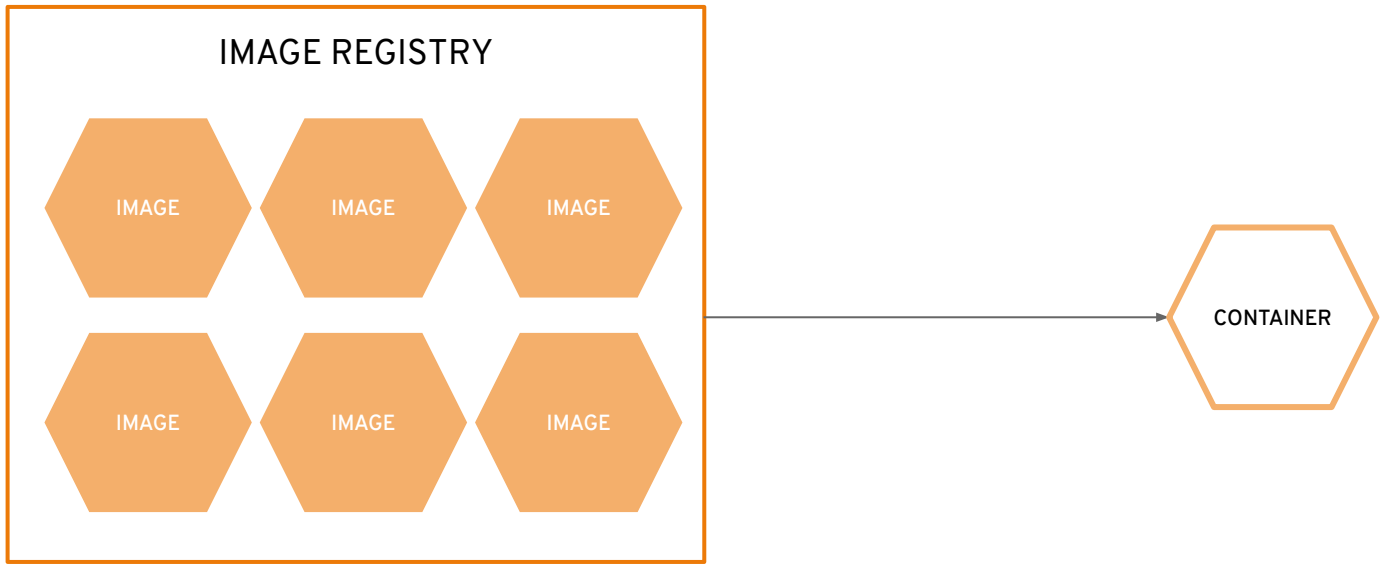
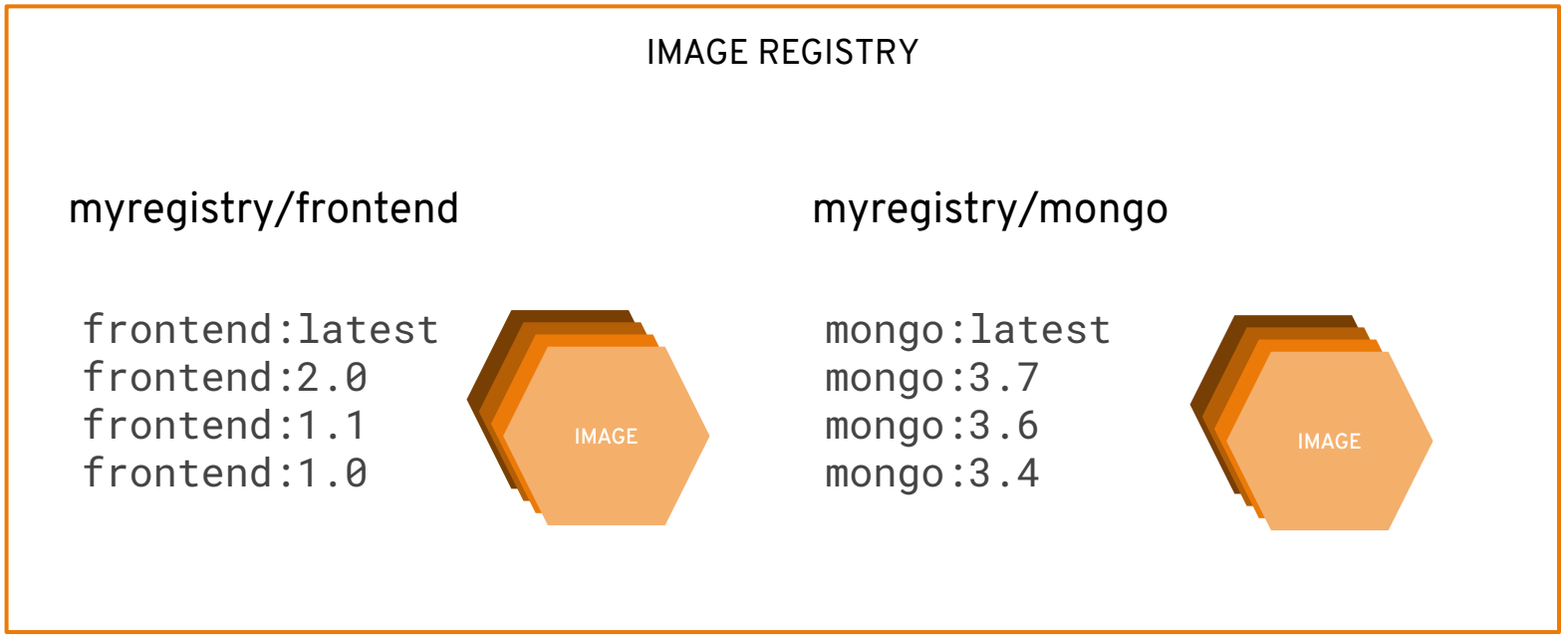
a container is the smallest compute unit

containers are created from container images

container images are stored in an image registry

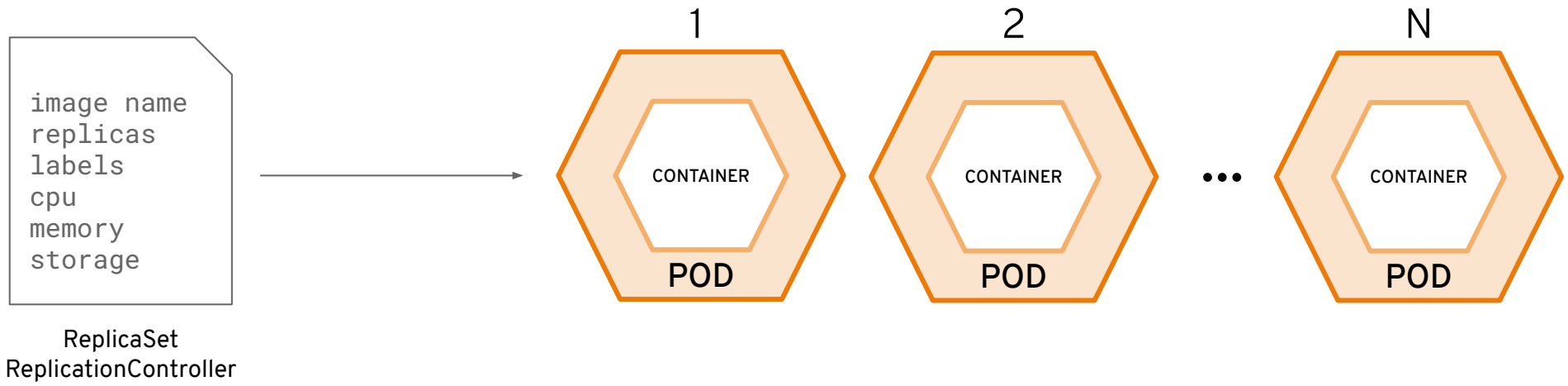


an image repository contains all versions of an image in the image registry



containers are wrapped in pods which are units of deployment and management

`ReplicationControllers` & `ReplicaSets` ensure a specified number of pods are running at any given time



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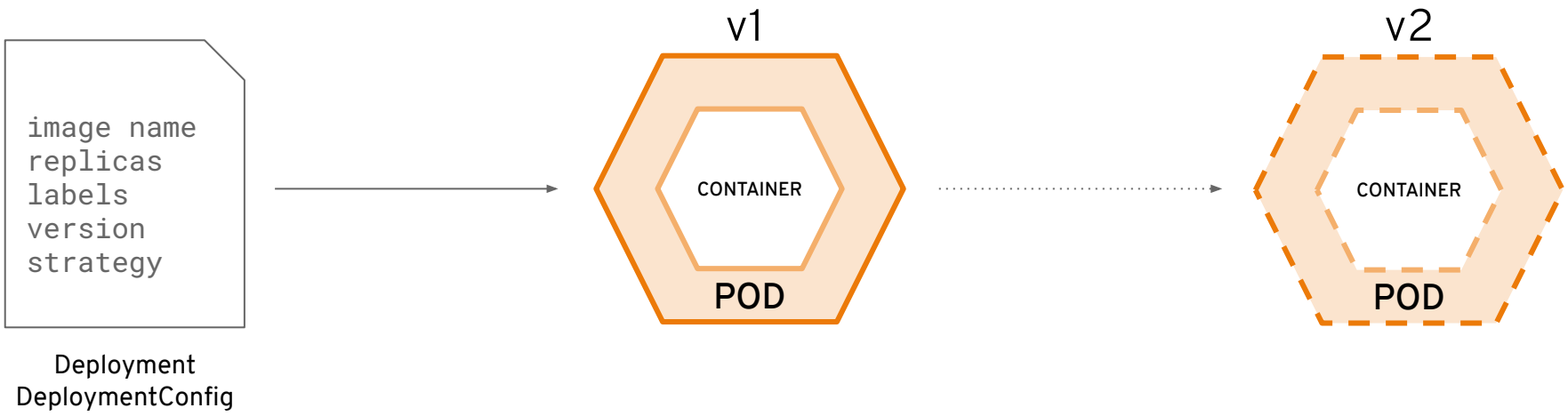
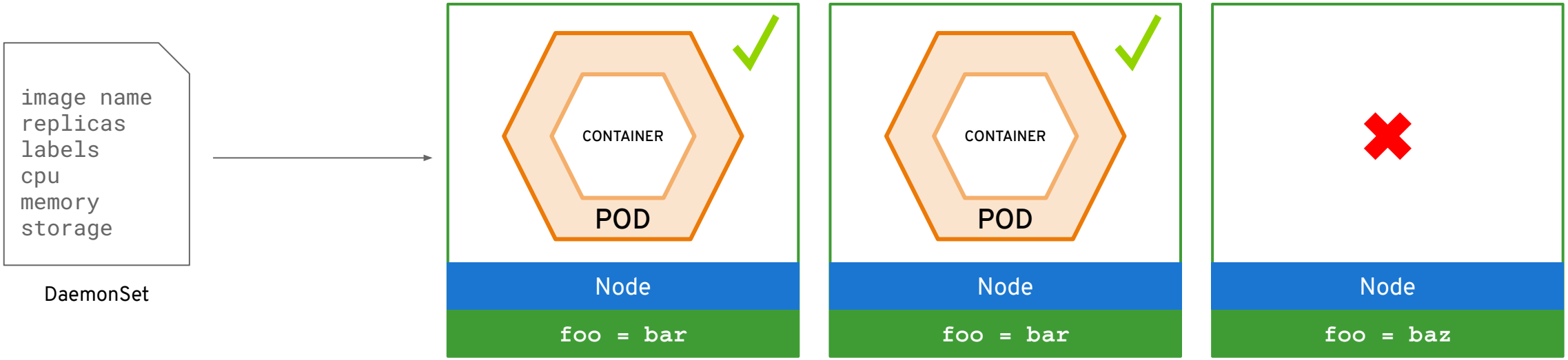
`Deployments` and `DeploymentConfigurations` define how to roll out new versions of Pods

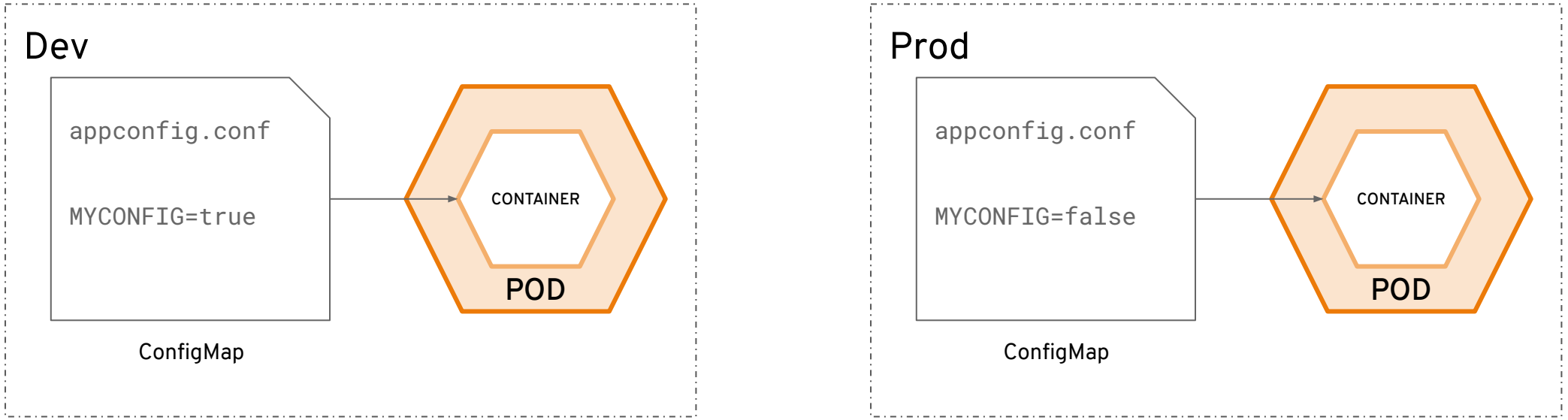


Red Hat

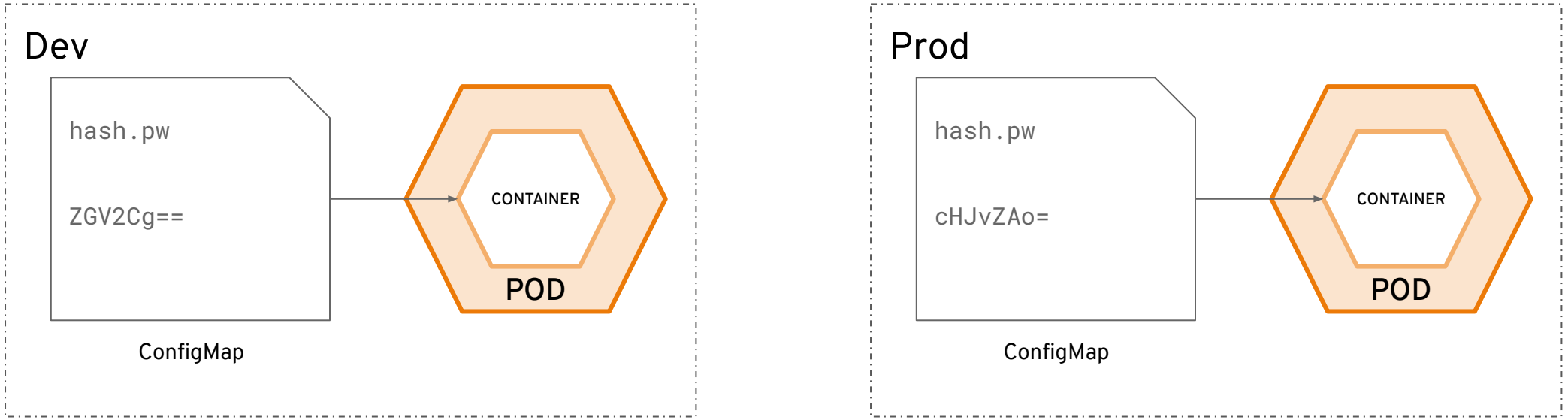
a `daemonset` ensures that all (or some) nodes run a copy of a pod



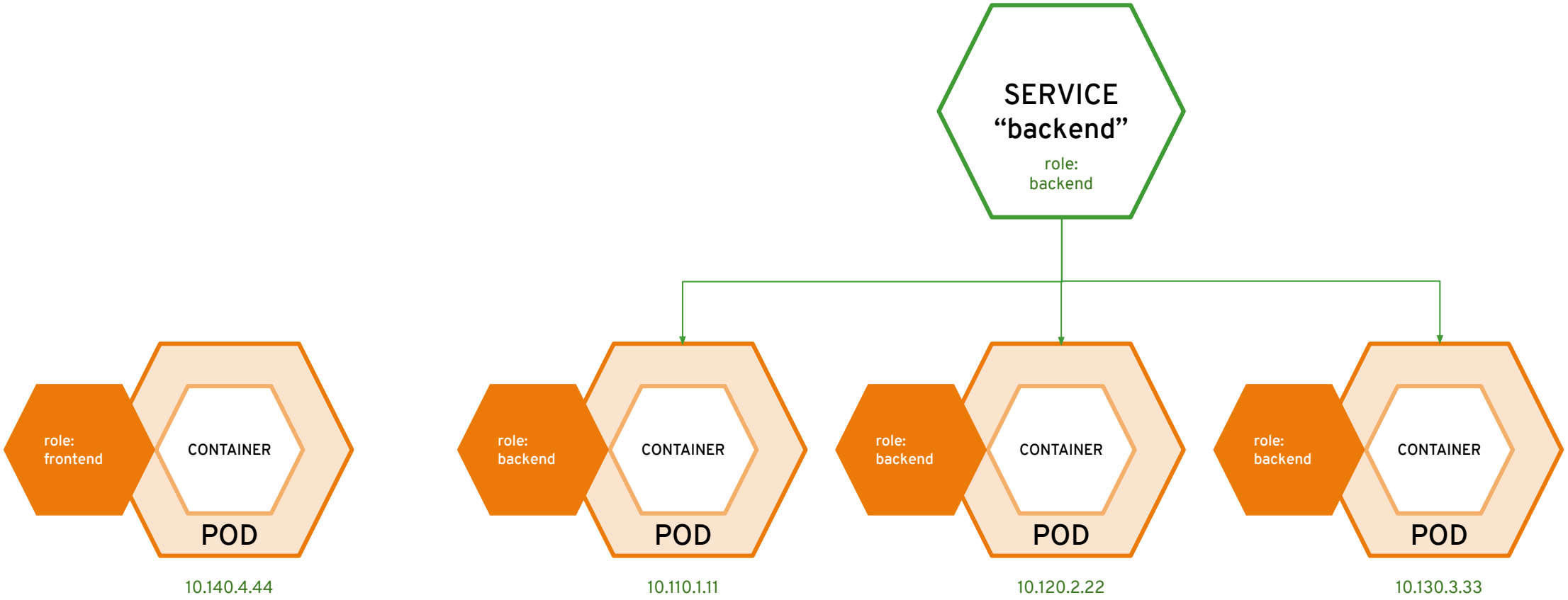
`configmaps` allow you to decouple configuration artifacts from image content



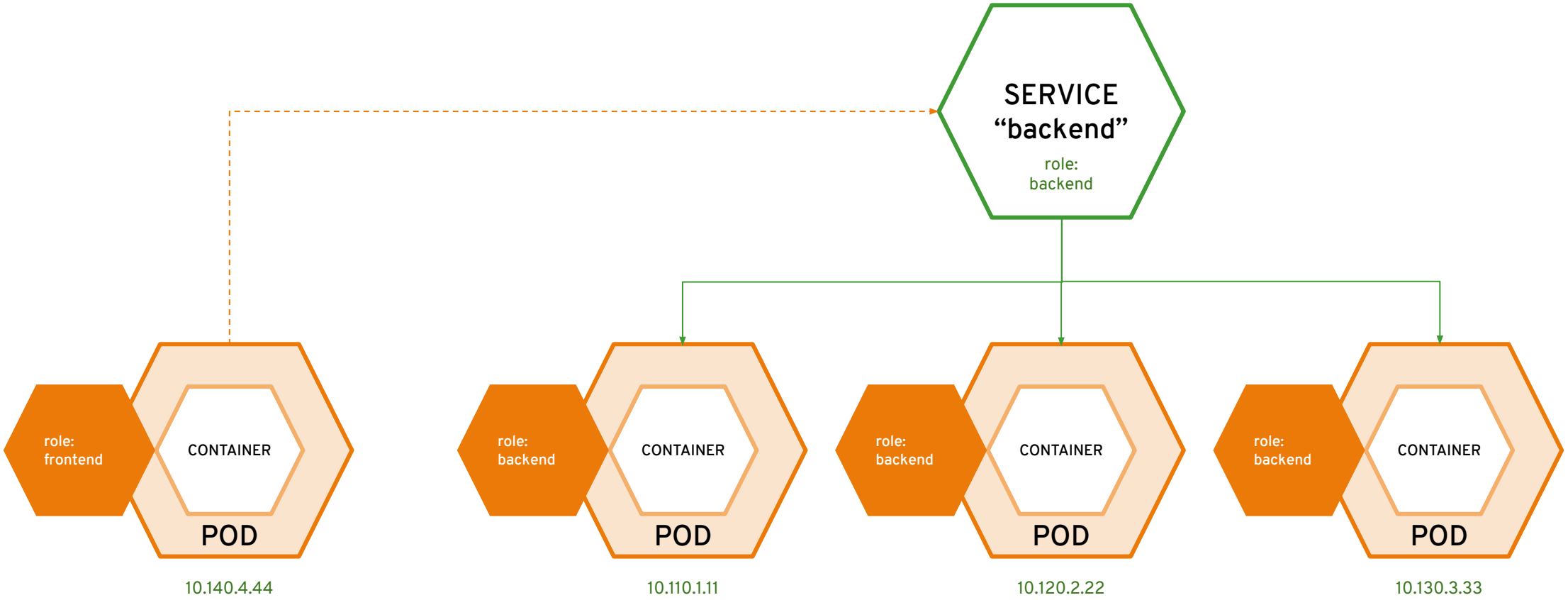
`secrets` provide a mechanism to hold sensitive information such as passwords



services provide internal load-balancing and service discovery across pods



apps can talk to each other via services



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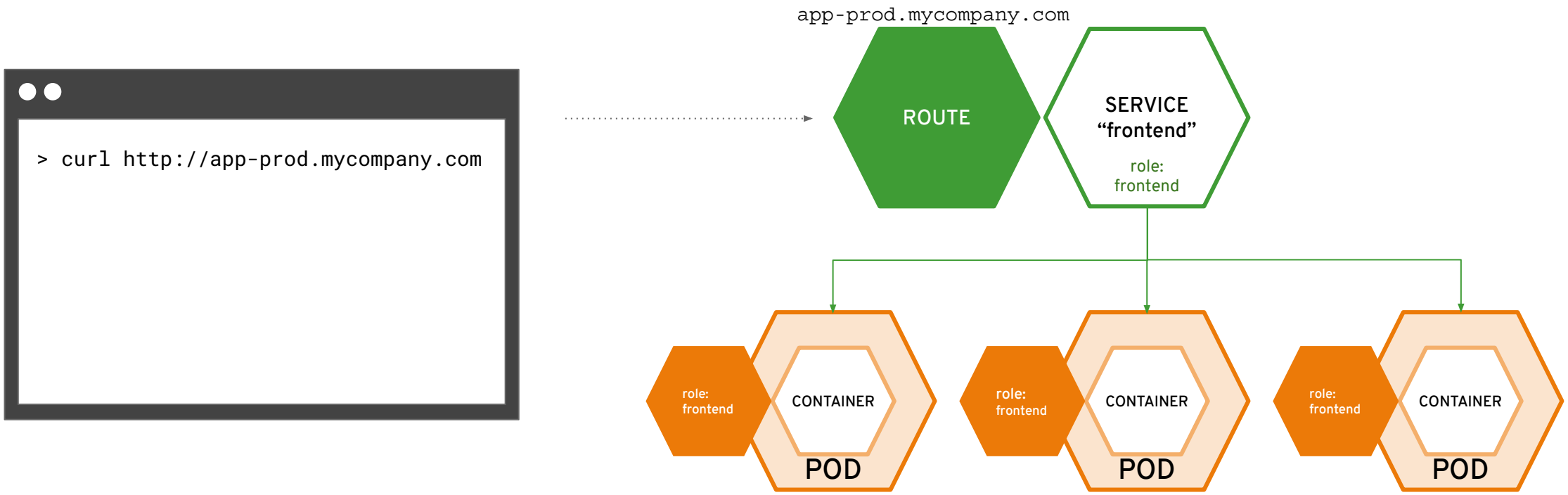
`routes` make services accessible to clients outside the environment via real-world urls



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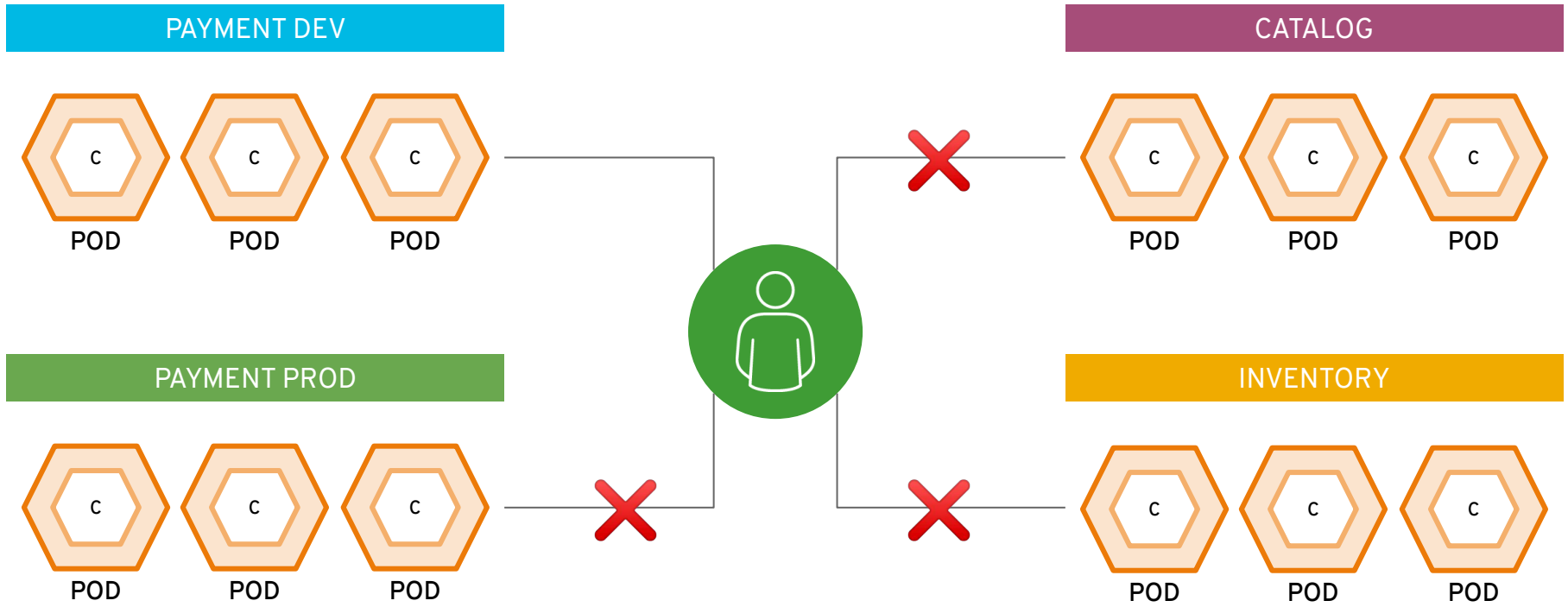
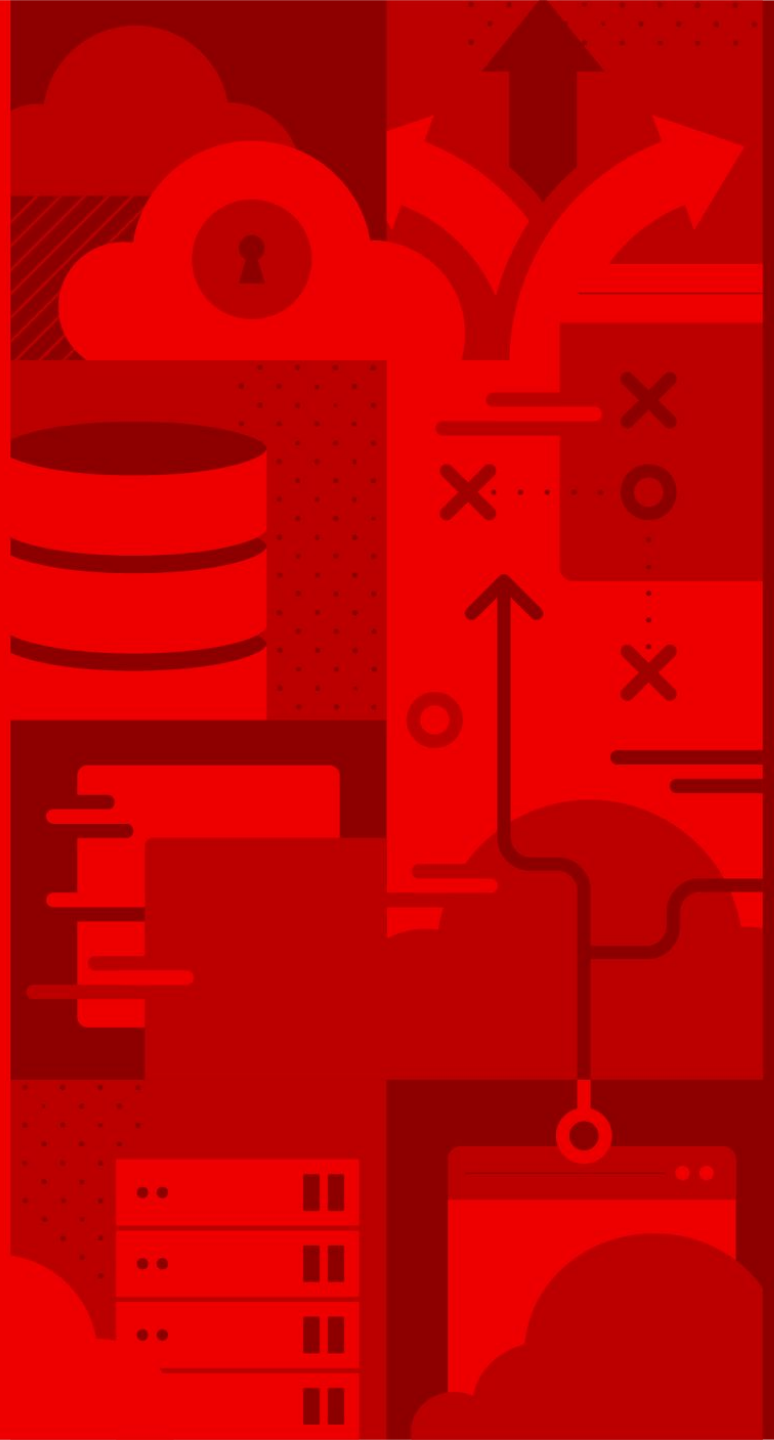
projects isolate apps across environments, teams, groups and departments





OpenShift 4 Architecture

Red Hat

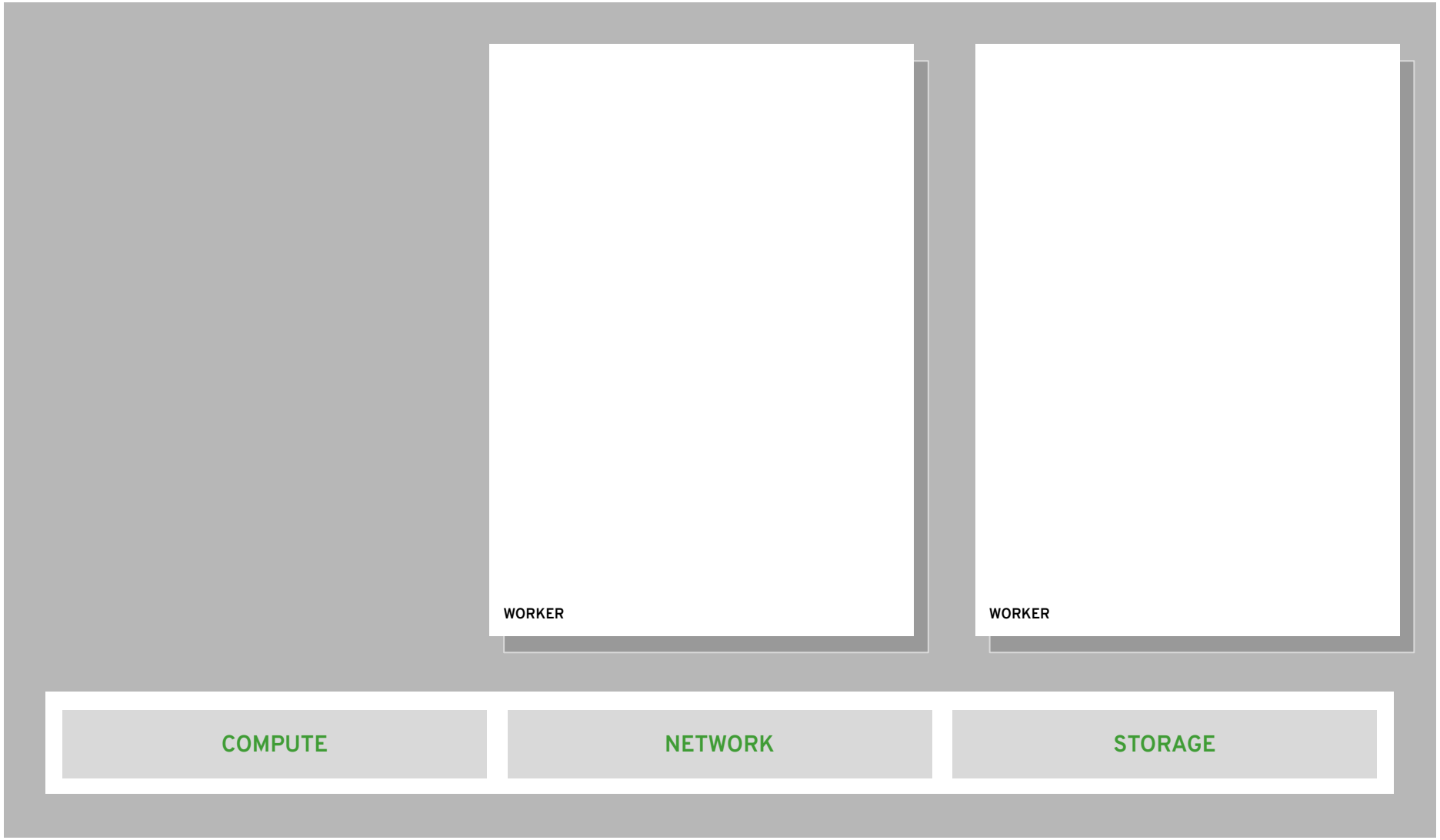
your choice of infrastructure

COMPUTE

NETWORK

STORAGE

workers run workloads



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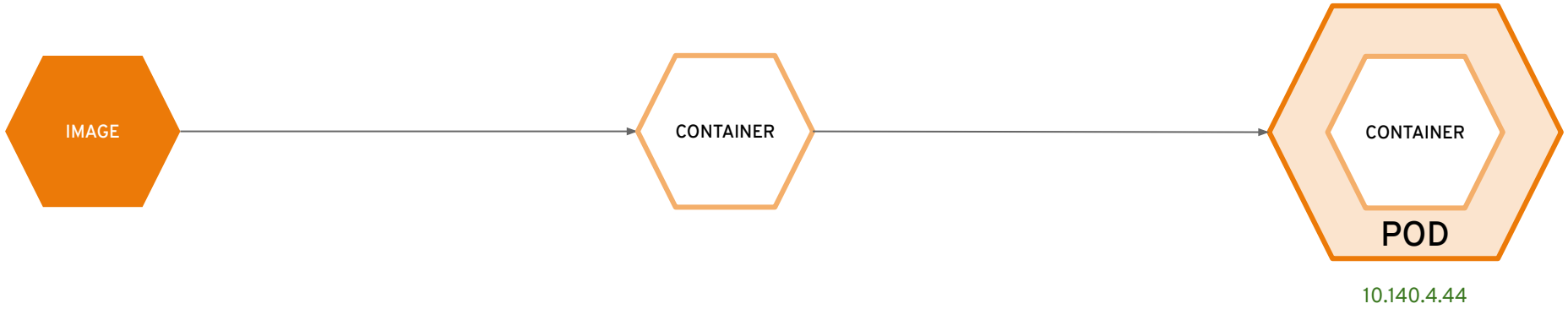
masters are the control plane

everything runs in pods



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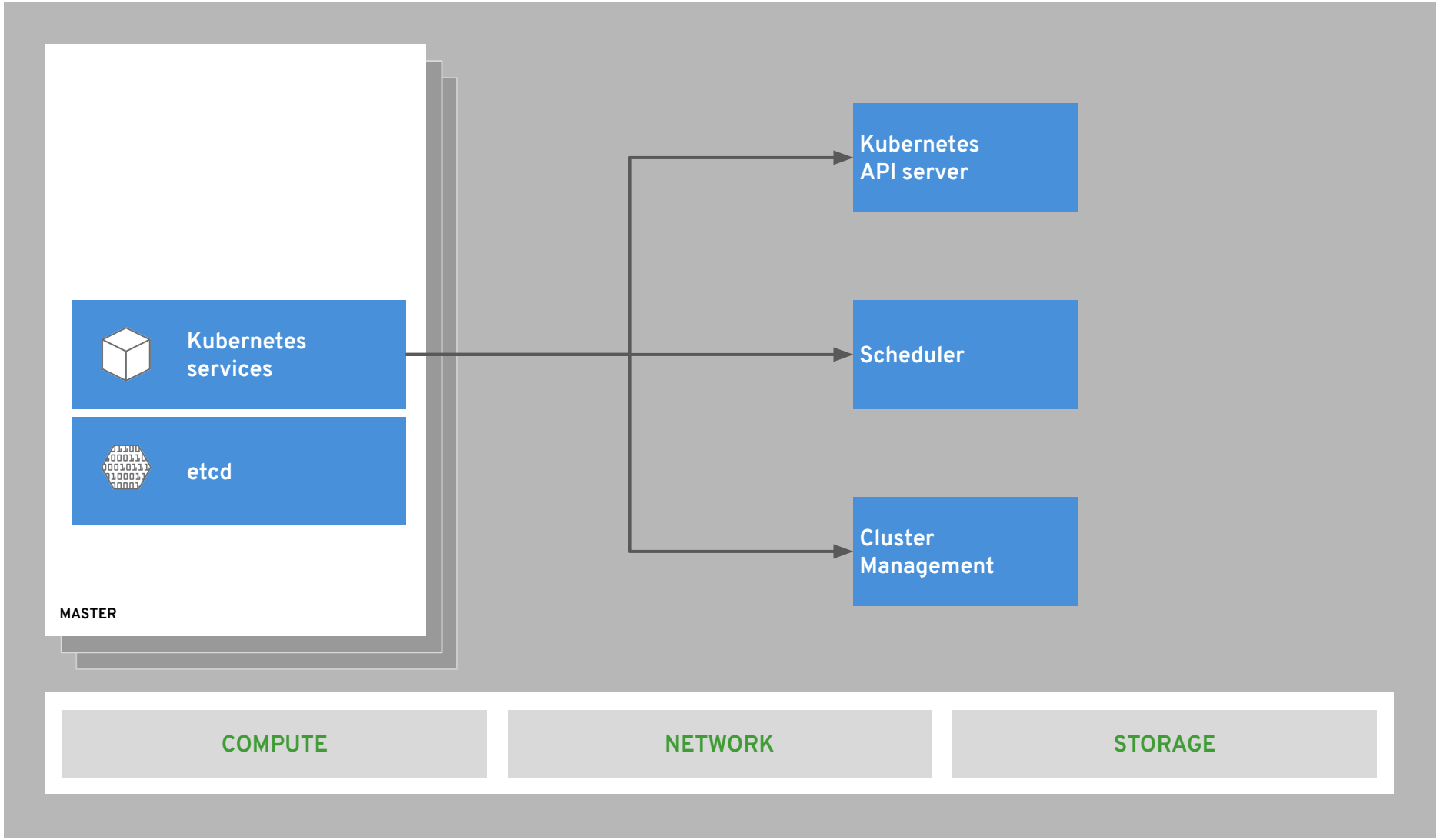
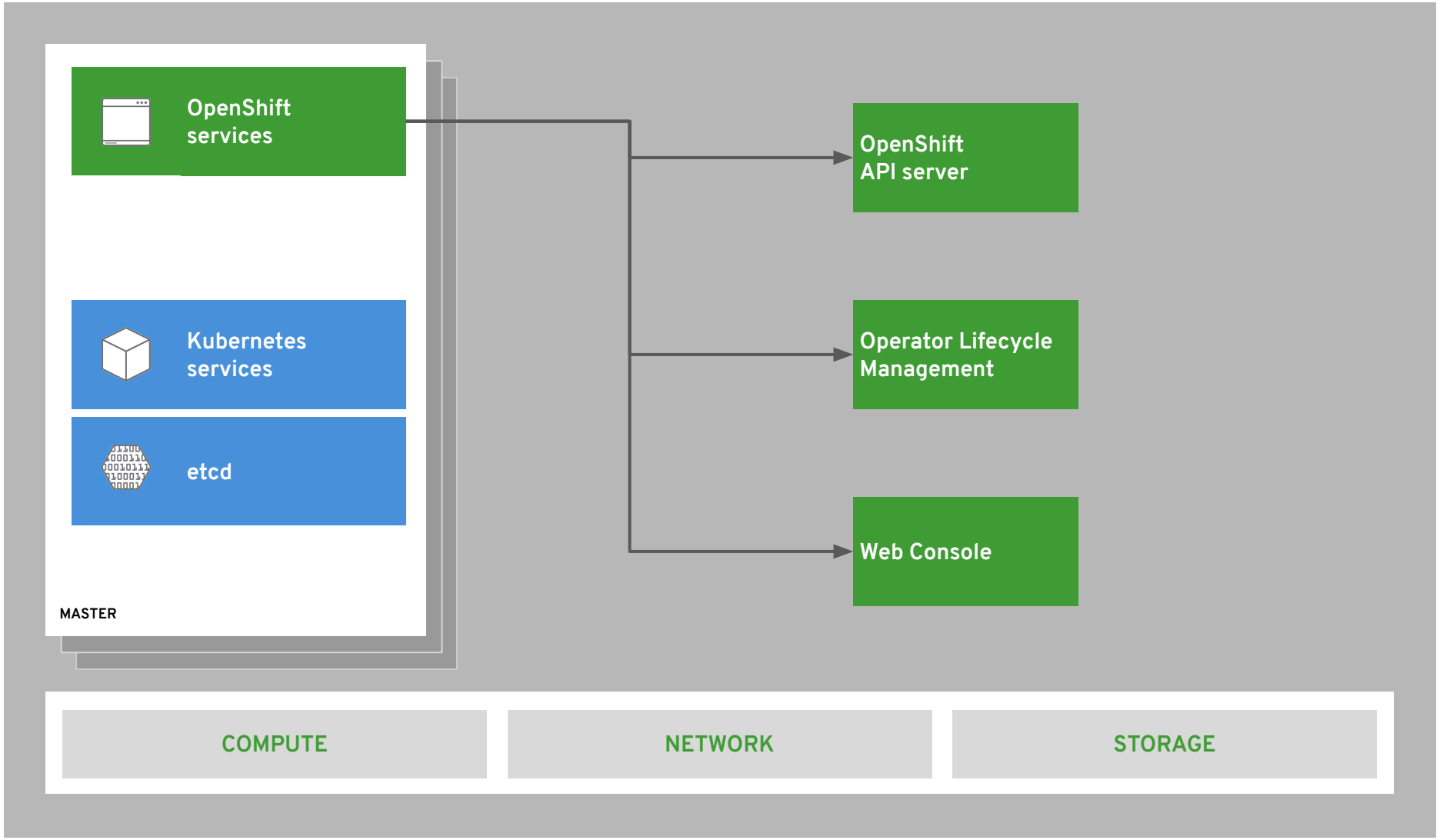
state of everything

core kubernetes components



core OpenShift components



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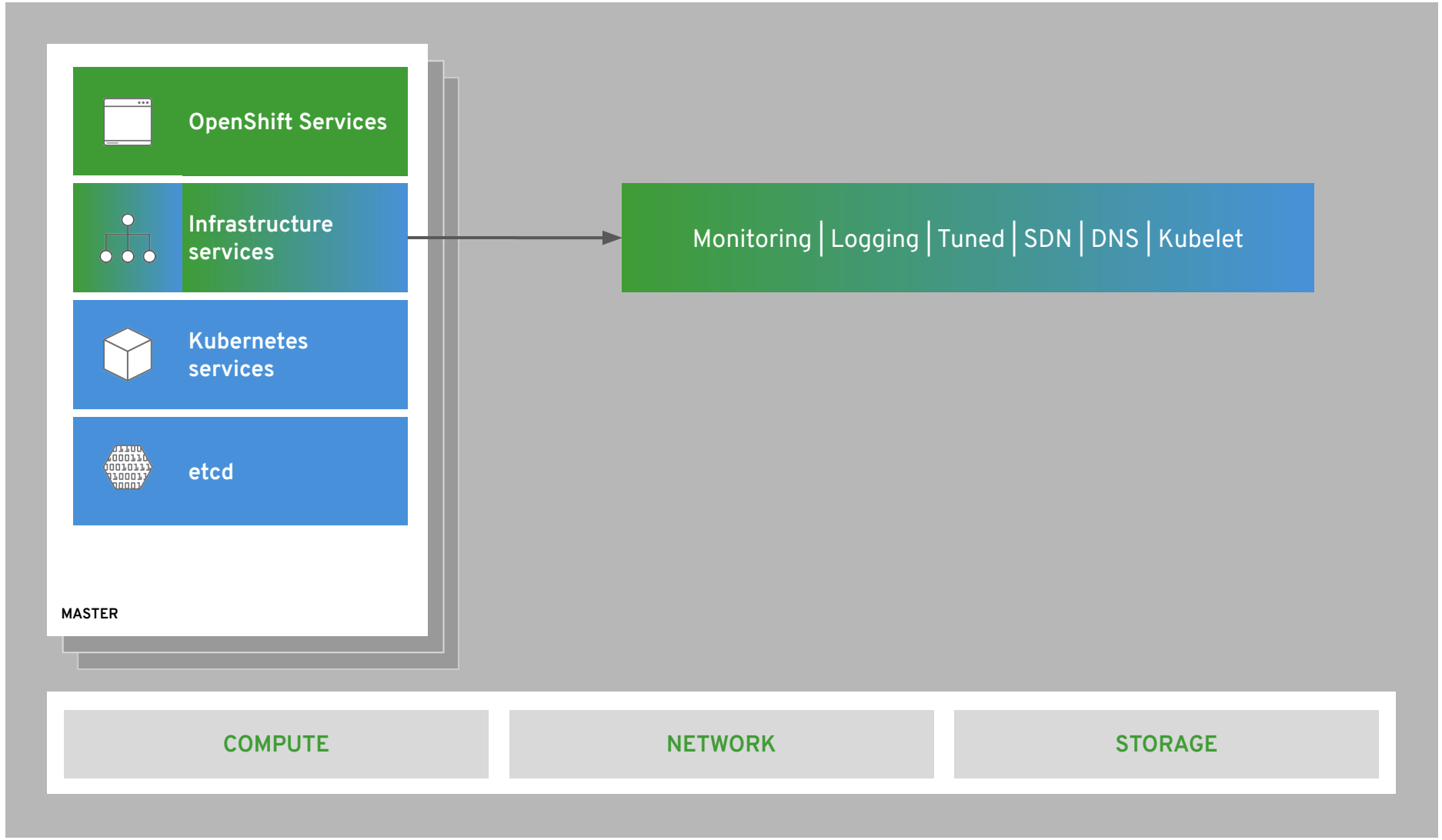
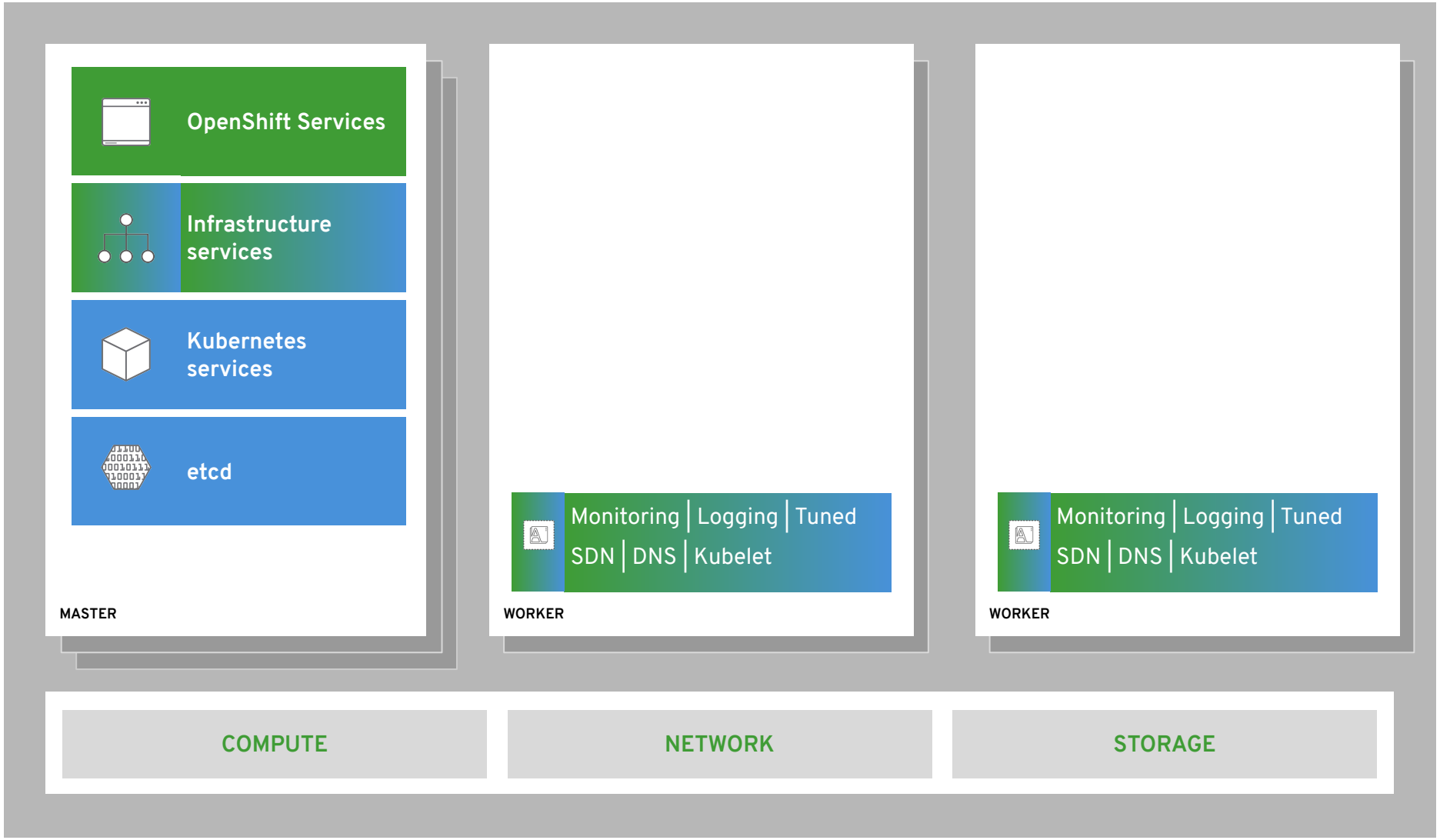
internal and support infrastructure services



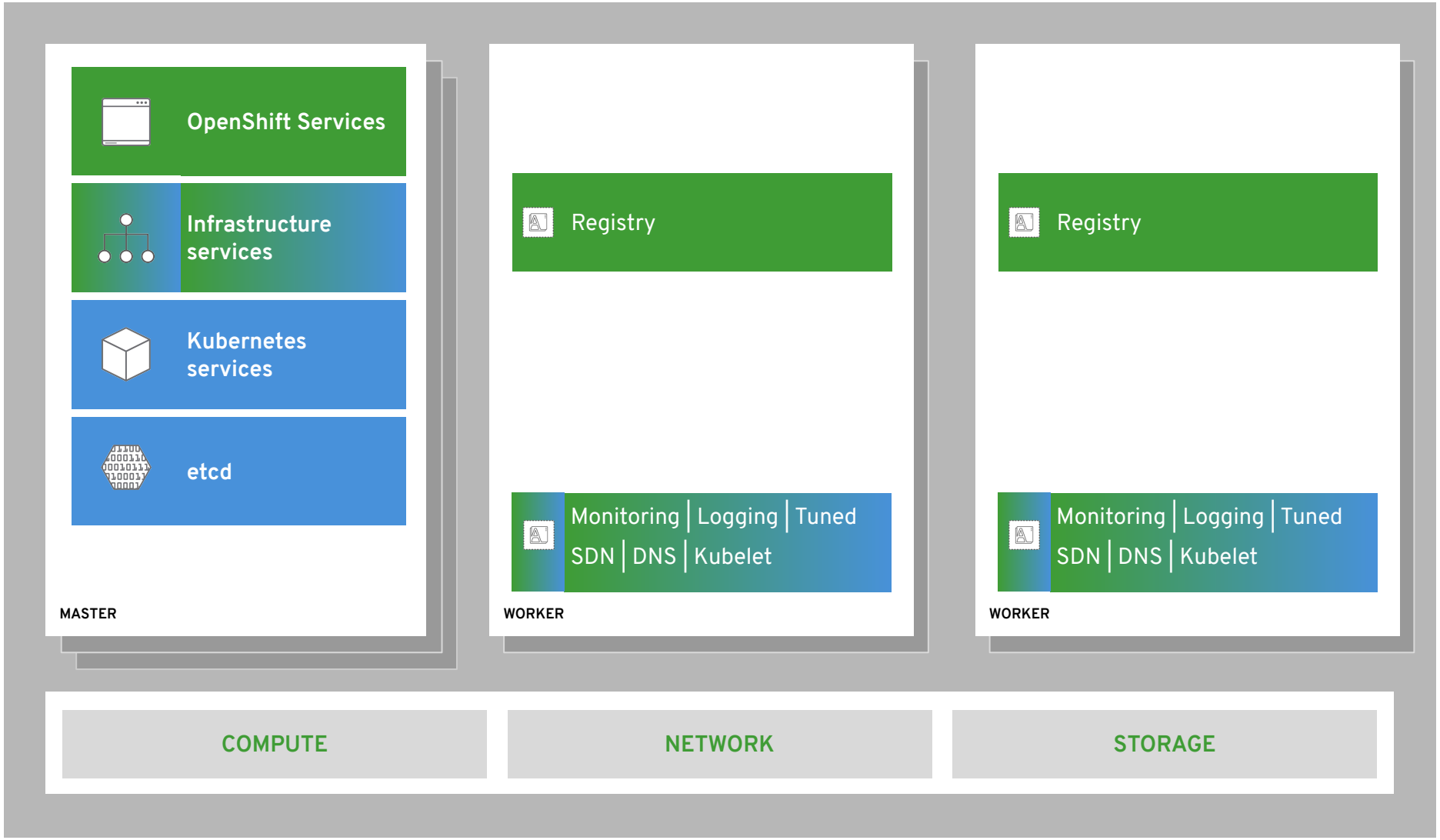
Red Hat

run on all hosts



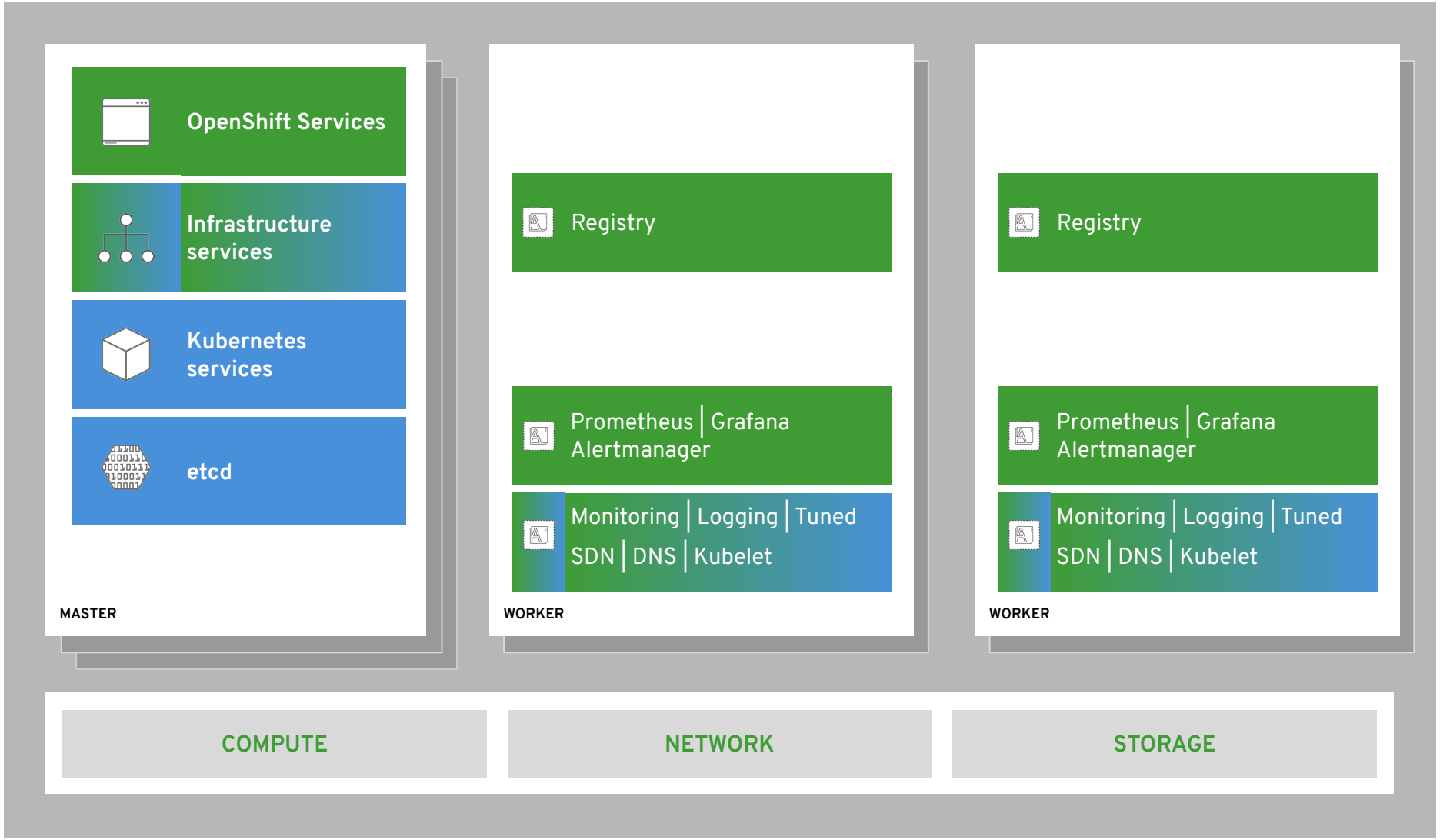
Red Hat

integrated image registry



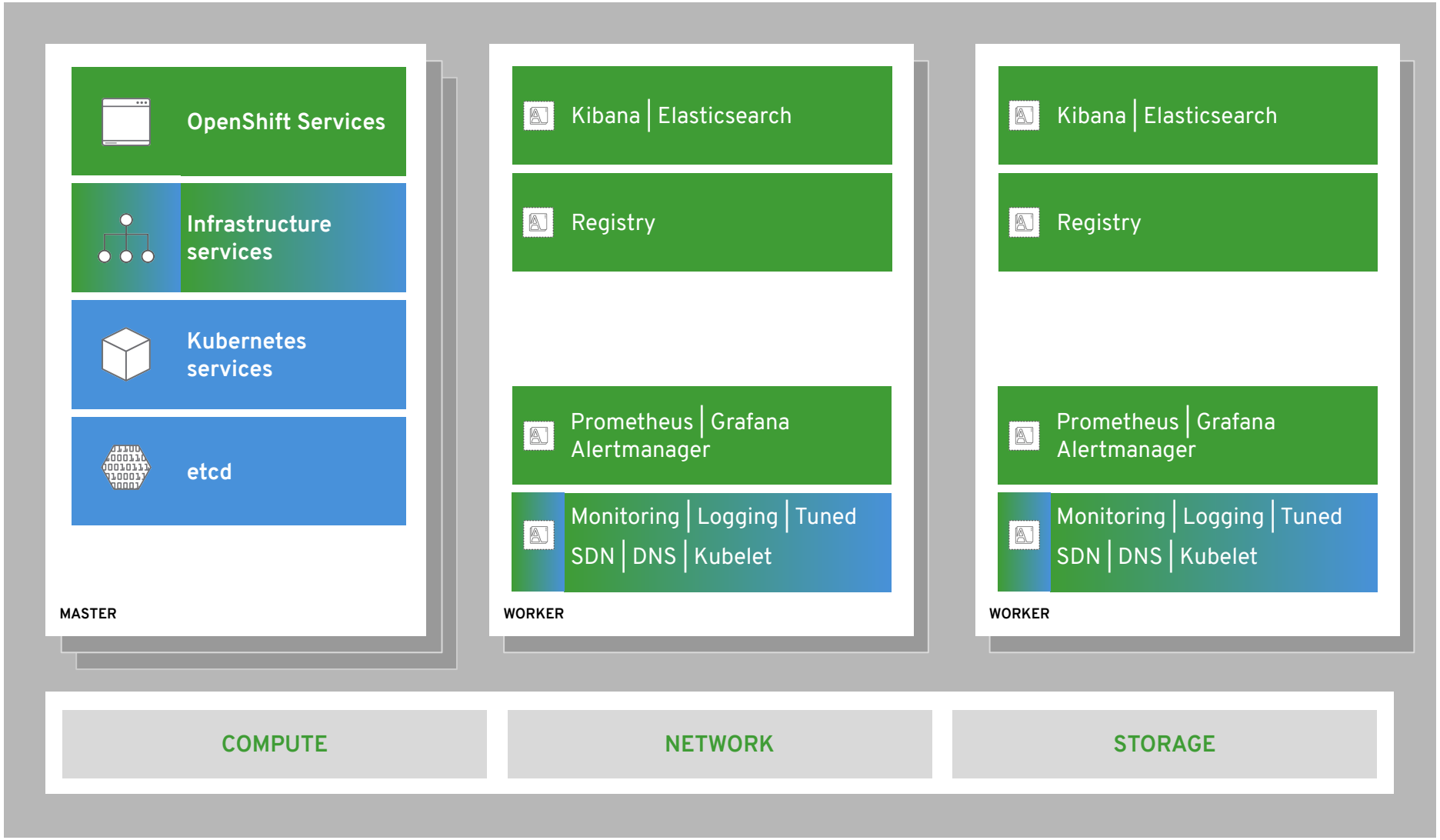
Red Hat

cluster monitoring

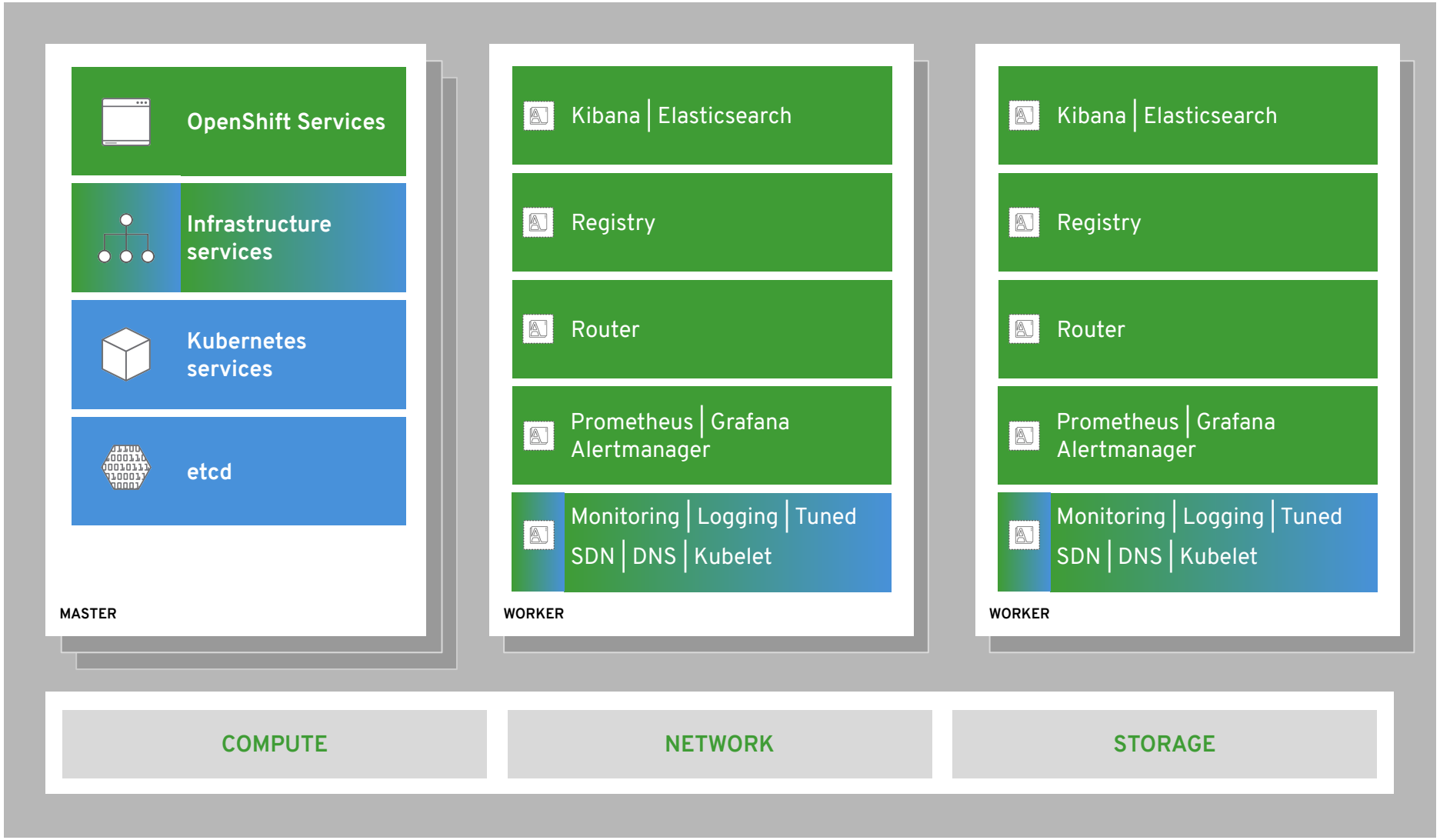


Red Hat

log aggregation



integrated routing



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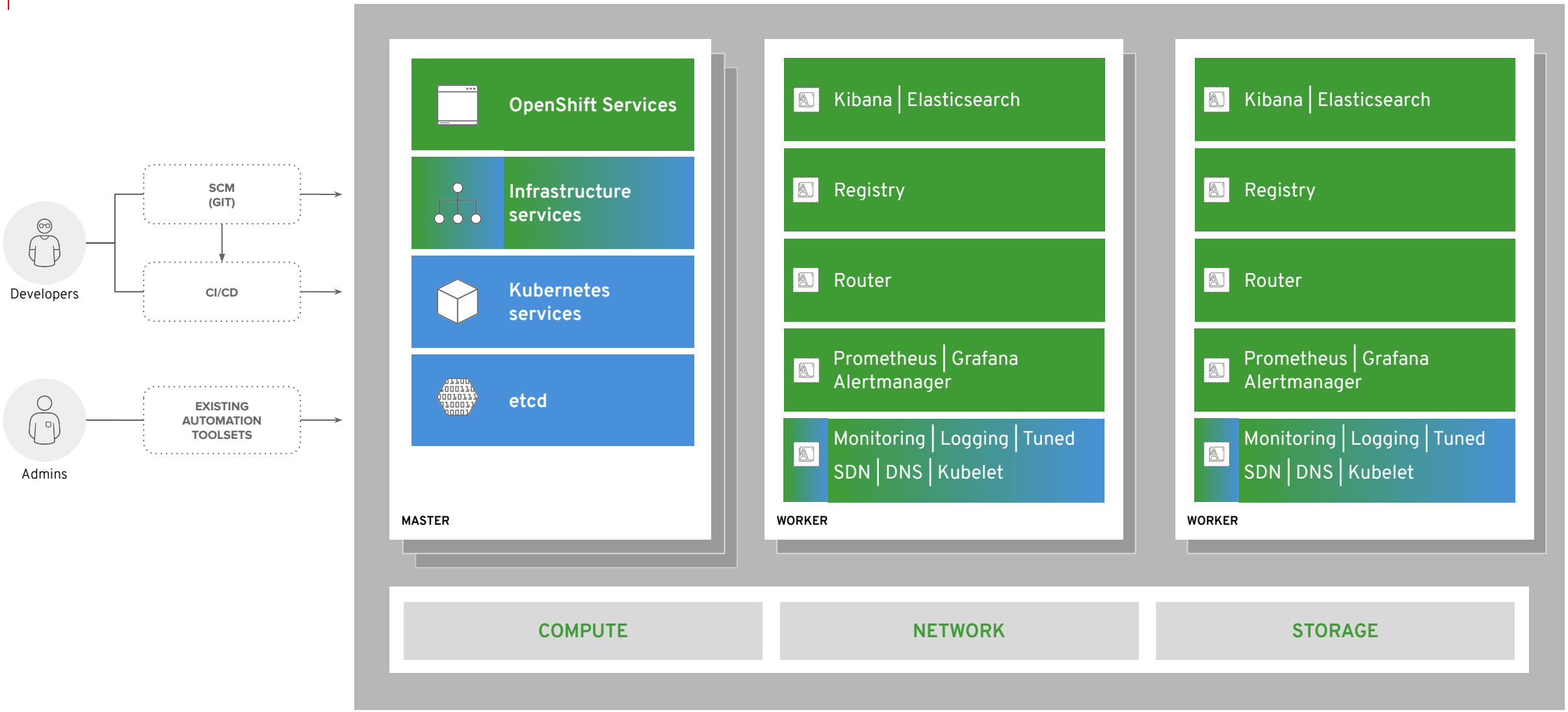
dev and ops via web, cli, API, and IDE

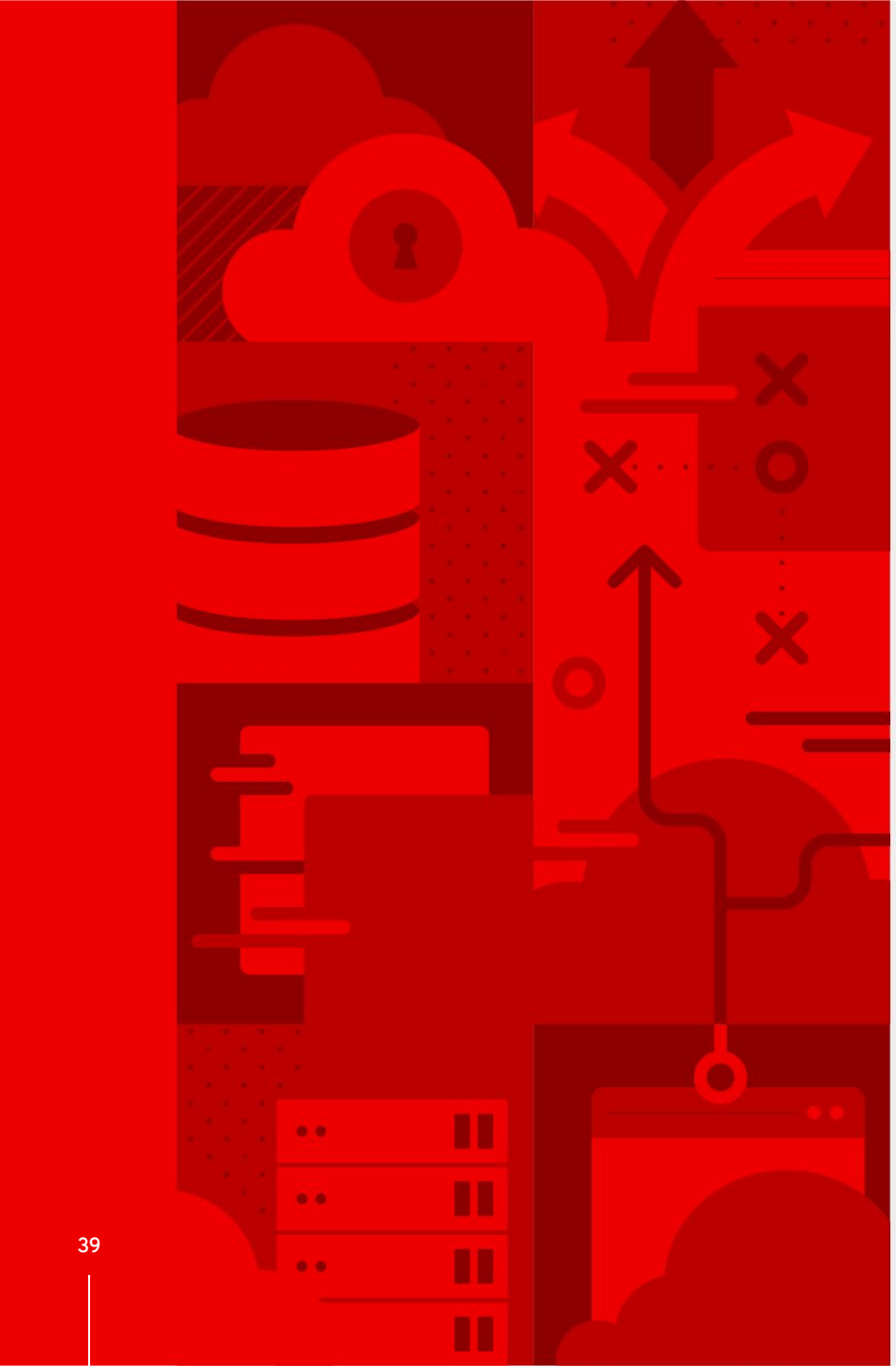


Red Hat

Need a Break ?

Till 12:00 am CEST

Red Hat



Welcome back !

Red Hat

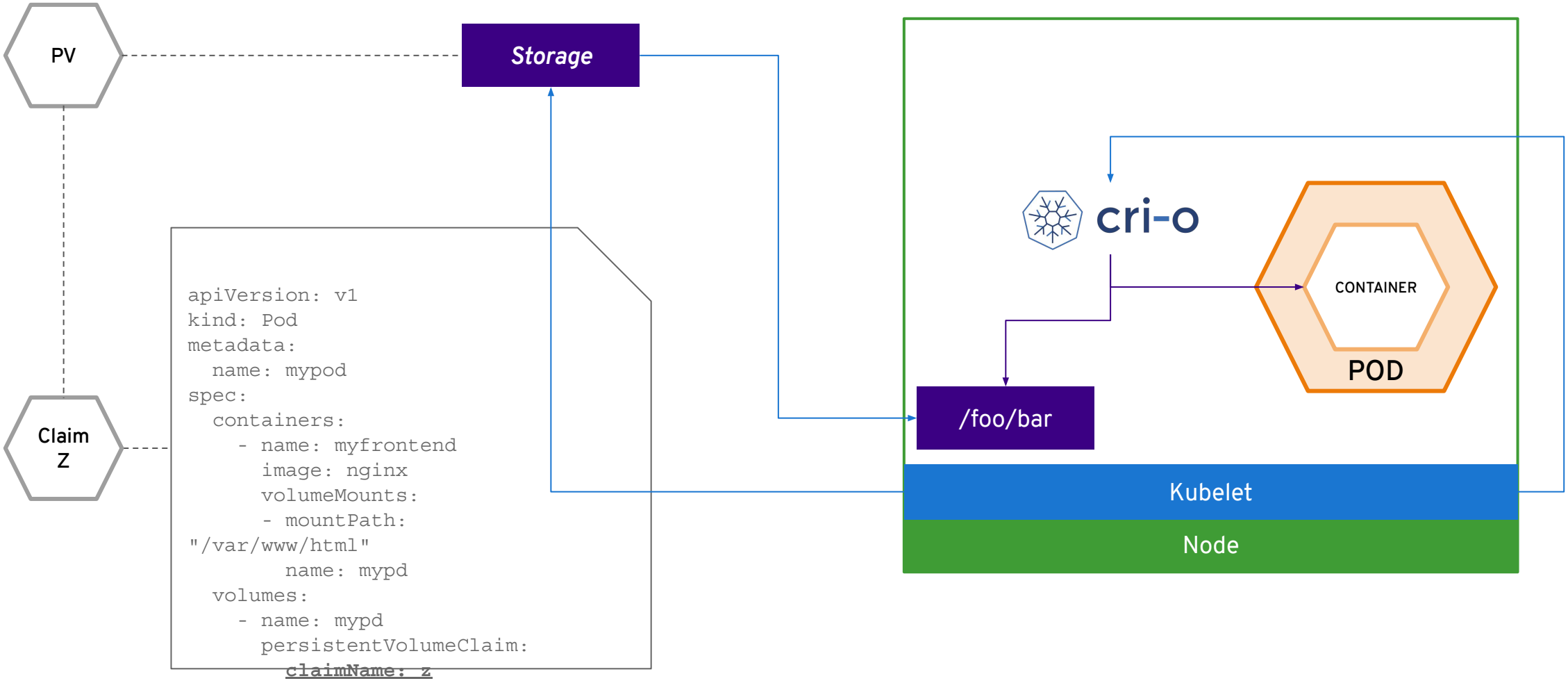
Persistent Storage

Connecting real-world storage to your containers to enable stateful applications

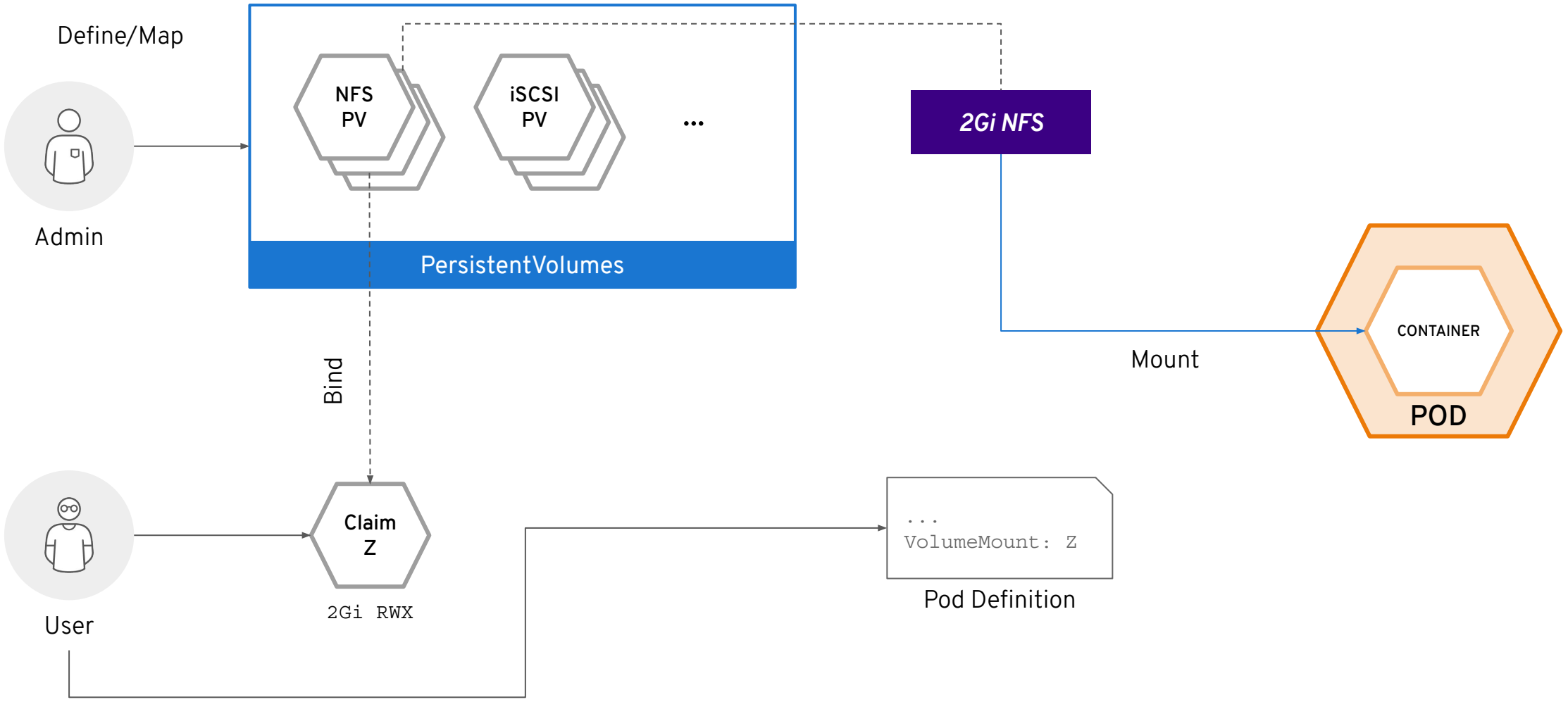
A broad spectrum of static and dynamic storage endpoints

NFS	OpenStack Cinder	iSCSI	Azure Disk	AWS EBS	FlexVolume
GlusterFS	Ceph RBD	Fiber Channel	Azure File	GCE Persistent Disk	VMWare vSphere VMDK
		NetApp Trident*	Container Storage Interface (CSI)**		

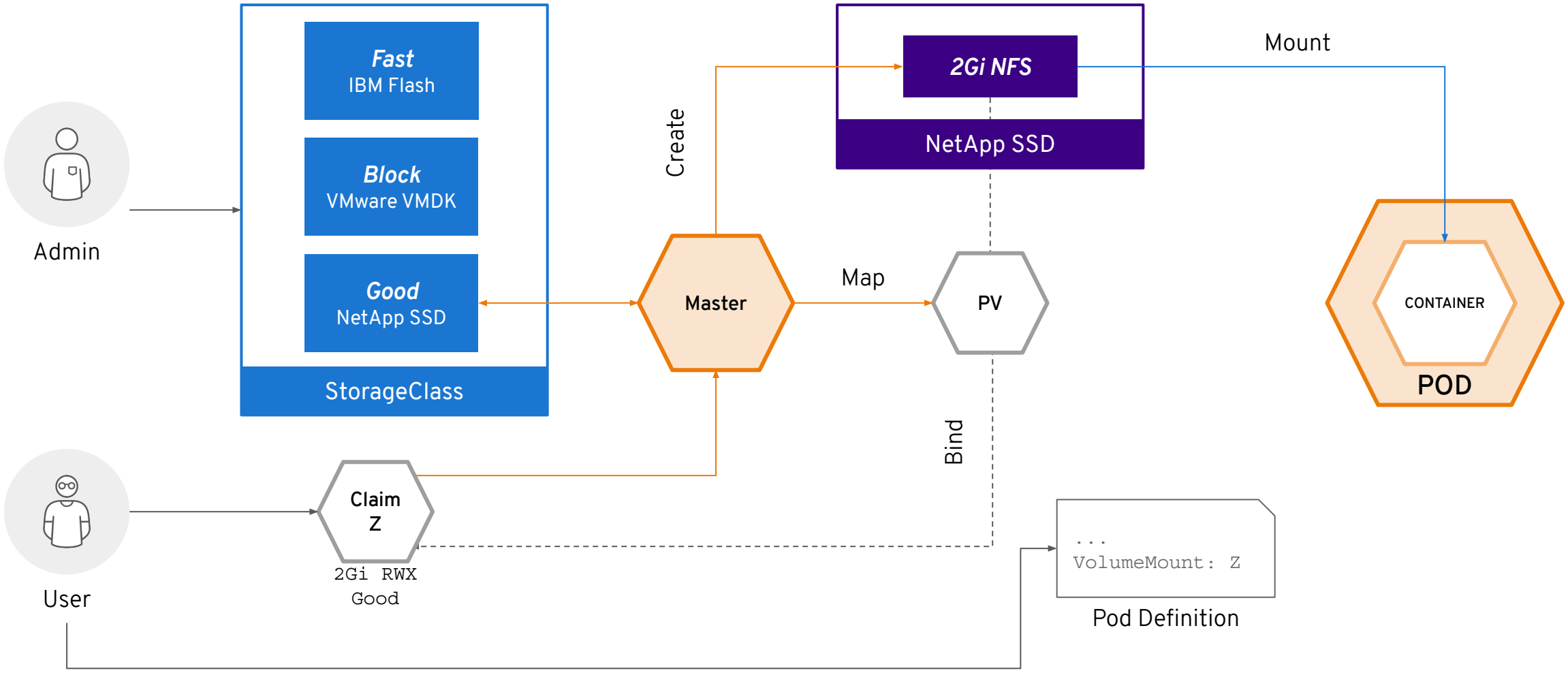
PV Consumption



Static Storage Provisioning



Dynamic Storage Provisioning



Red Hat

RED HAT®
OPENSHIFT
Container Storage

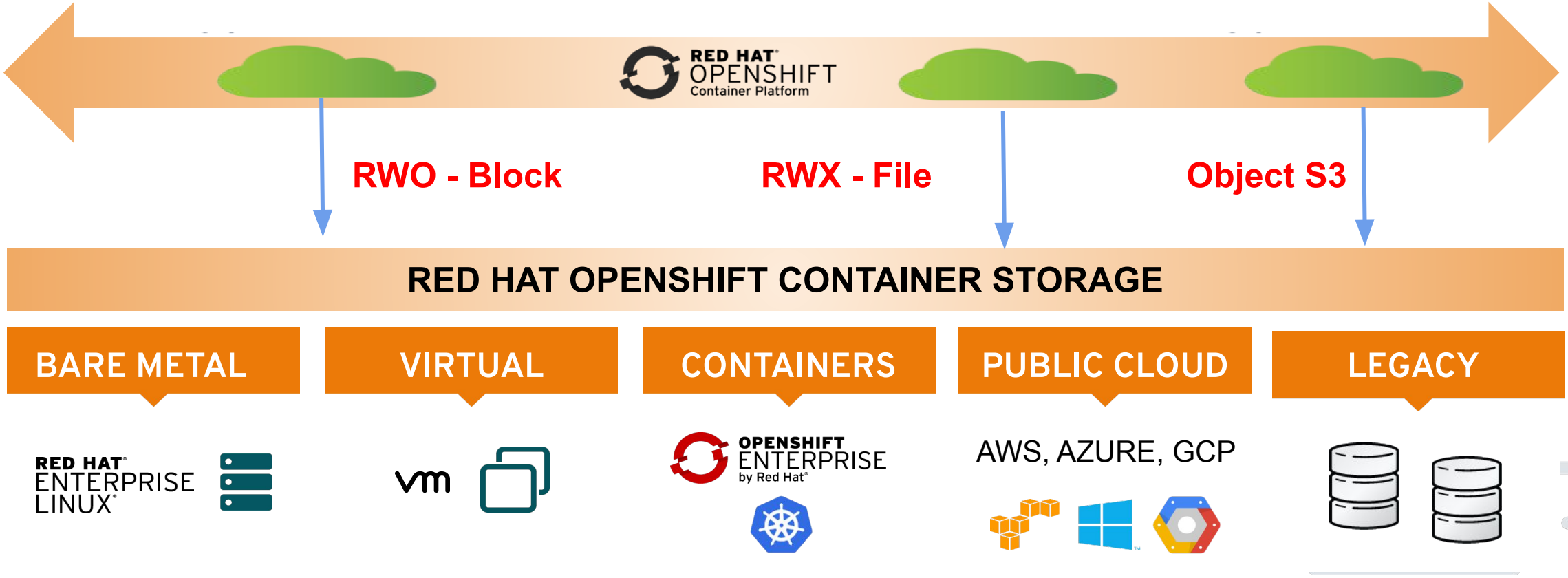
What is it?

Add-On for OpenShift for running stateful apps

Highly scalable, production-grade persistent storage

- For **stateful applications** running in Red Hat® OpenShift
- Optimized for Red Hat **OpenShift Infrastructure services**
- Developed, released and deployed in synch with Red Hat OpenShift
- Supported via a single contract with Red Hat OpenShift
- Complete persistent storage fabric across hybrid cloud for OCP

Complete Storage for Container Platform



Provides Storage for All Apps and infrastructure Services
in their native interfaces

OCS 4.X - Focus Areas

EASE OF USE

HYBRID CLOUD
& DATA SERVICES

STORAGE
ENHANCEMENTS

Red Hat

Presenter's Name

Title

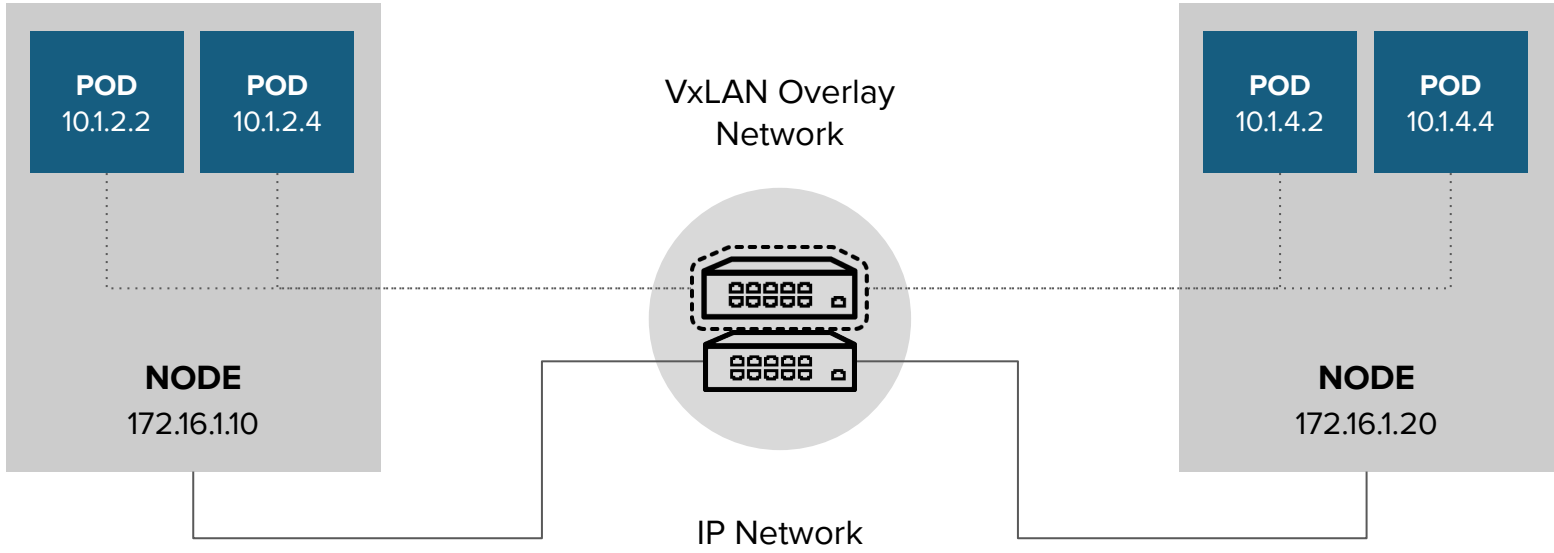
OpenShift Networking

Presenter's Name

Title

Red Hat

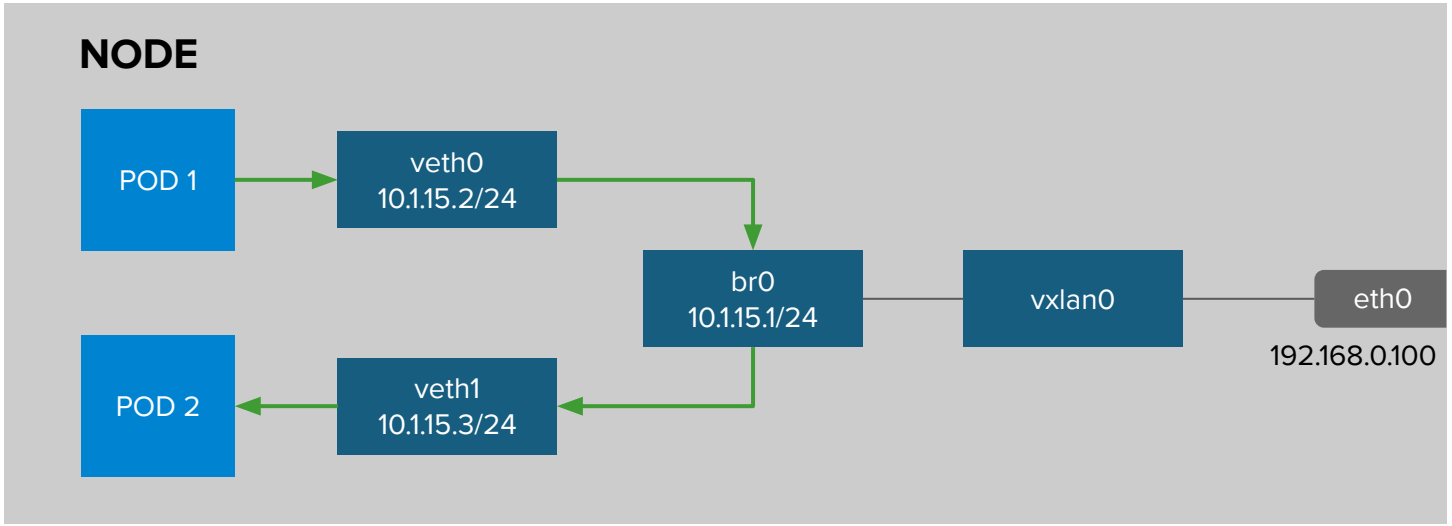
OPENSHIFT NETWORKING



Red Hat

OPENSHIFT SDN - OVS PACKET FLOW

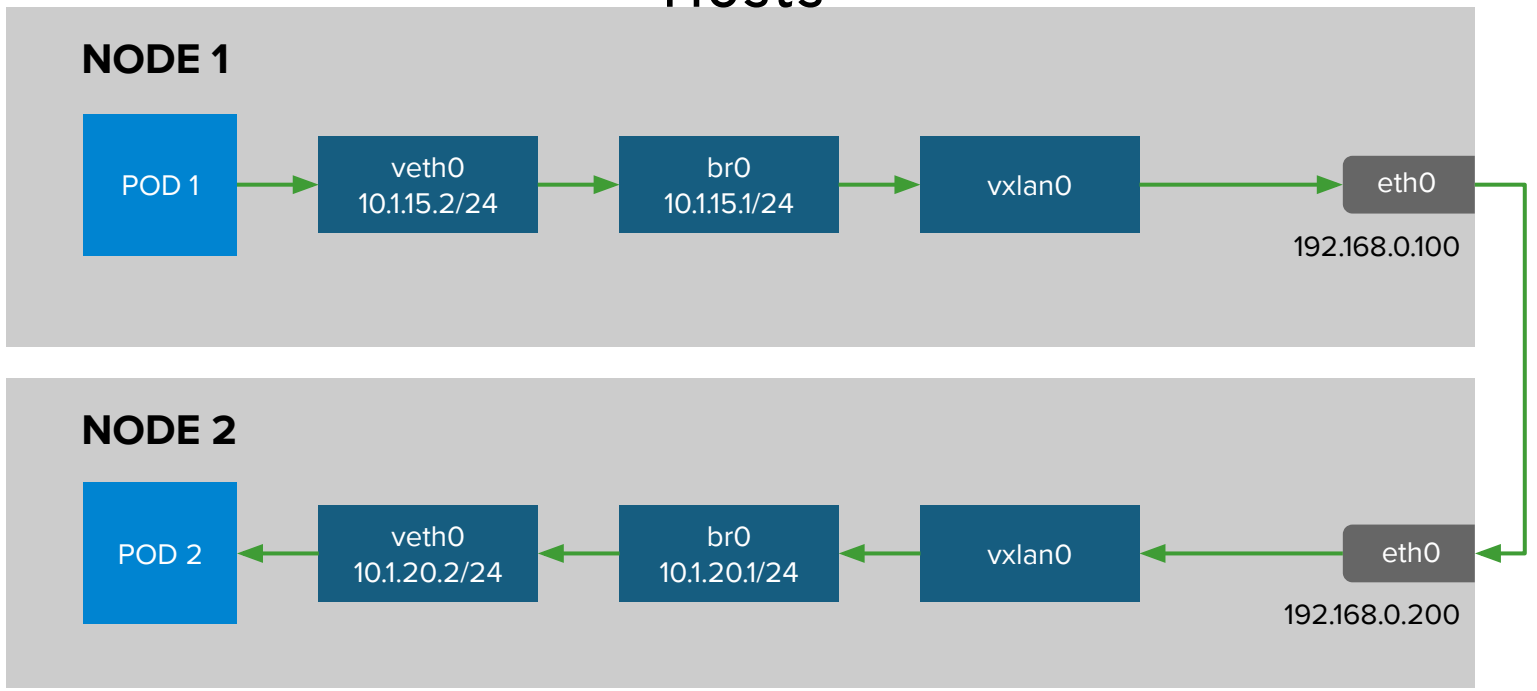
Container to Container on the Same Host



Red Hat

OPENSHIFT SDN - OVS PACKET FLOW

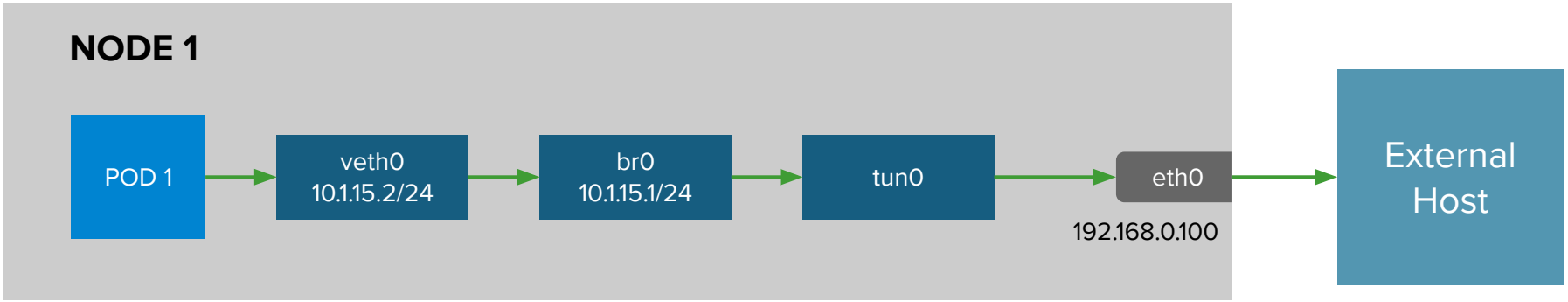
Container to Container on the Different Hosts



Red Hat

OPENSHIFT SDN - OVS PACKET FLOW

Container Connects to External Host



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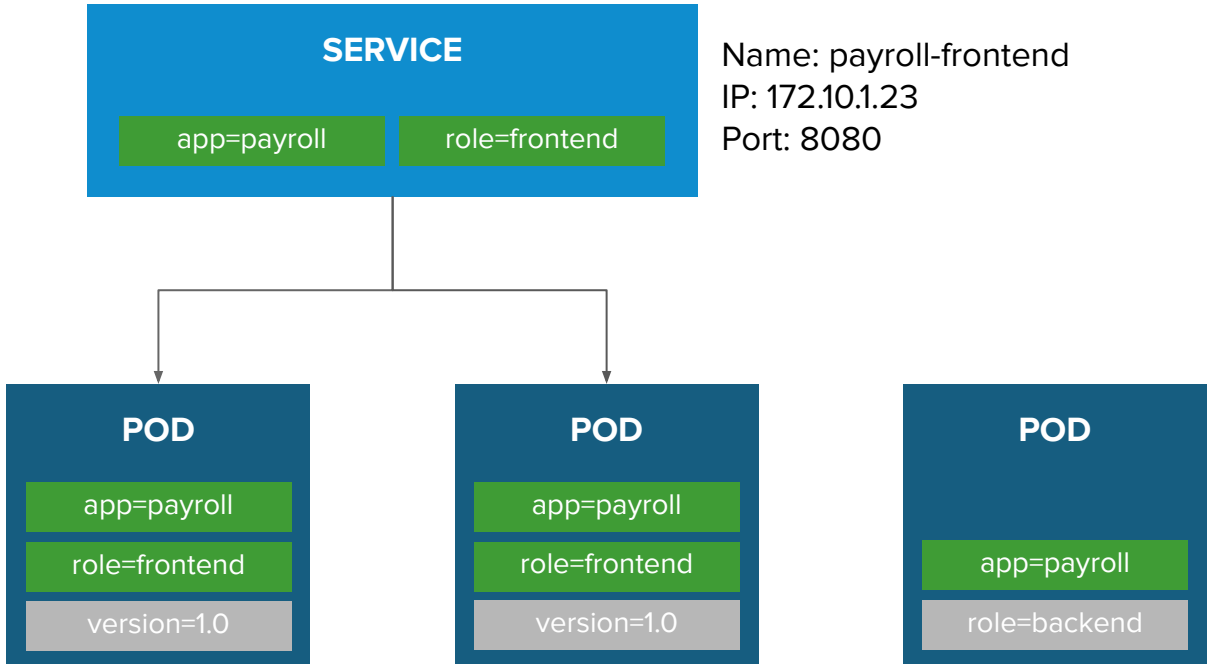
BUILT-IN SERVICE DISCOVERY
INTERNAL LOAD-BALANCING



Red Hat

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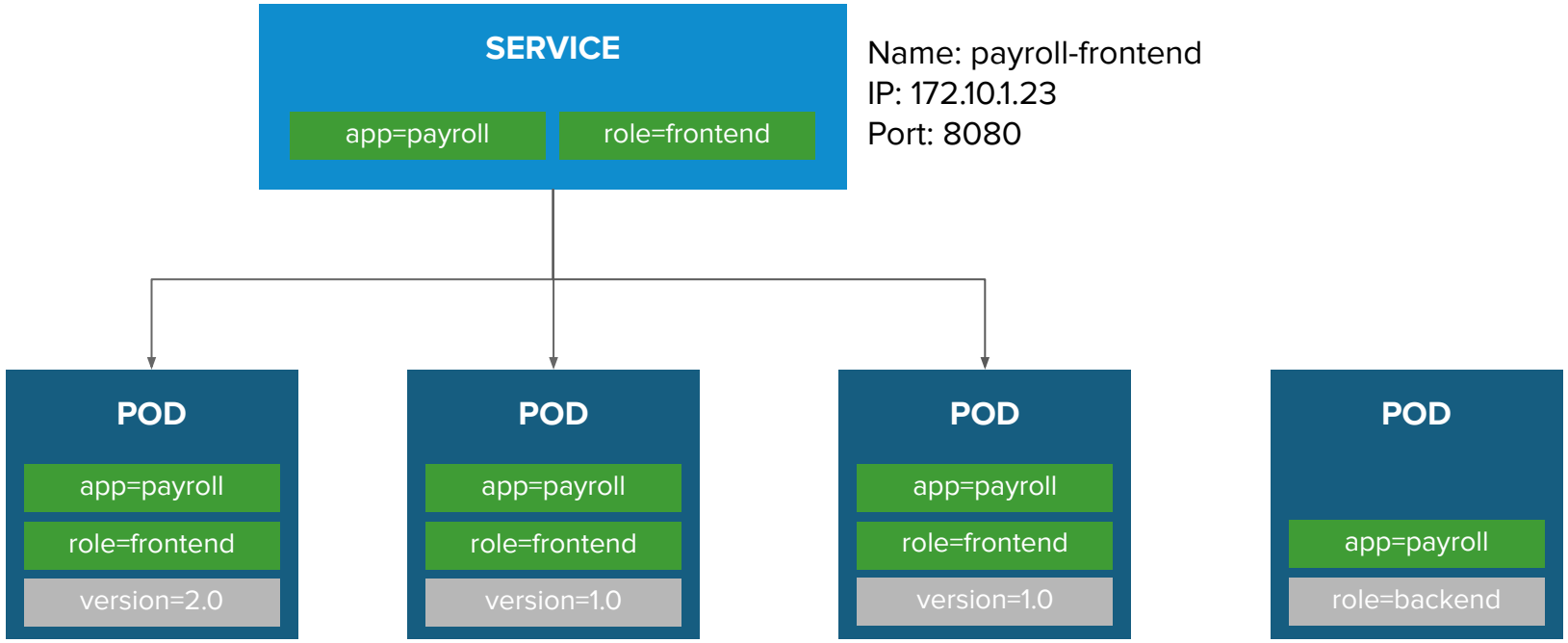
INTERNAL LOAD-BALANCING



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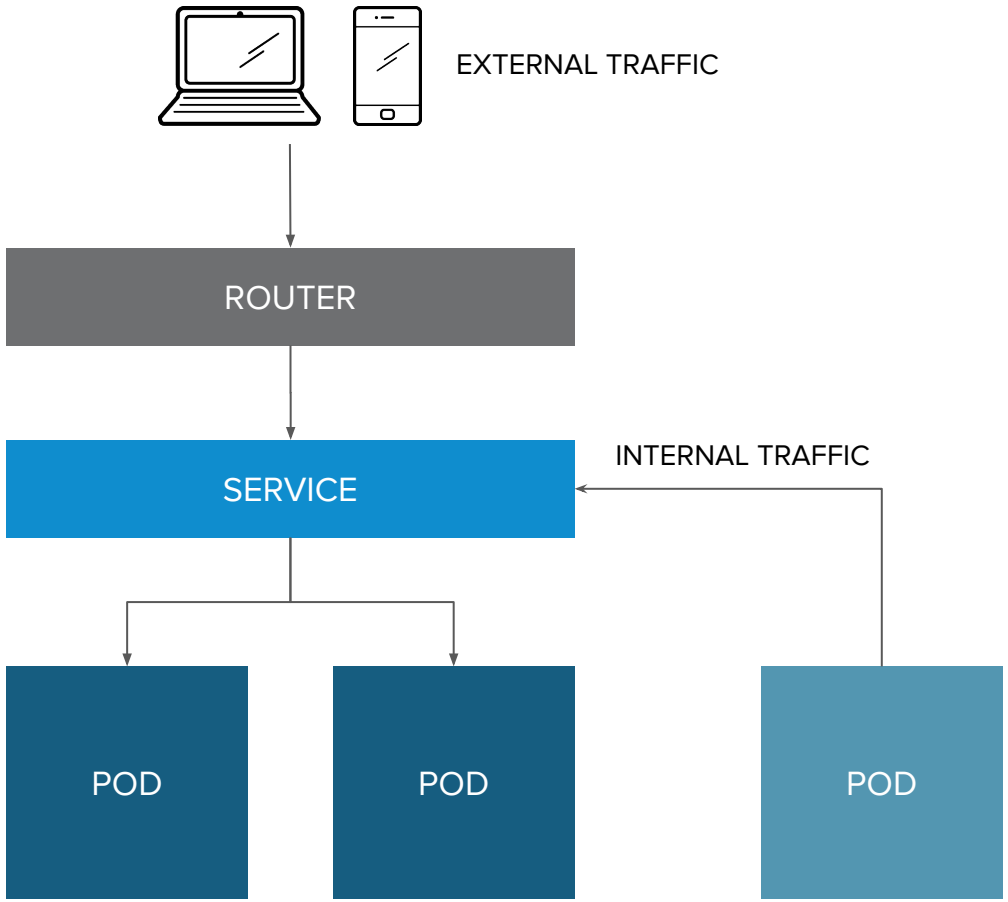
ROUTE EXPOSES SERVICES EXTERNALLY



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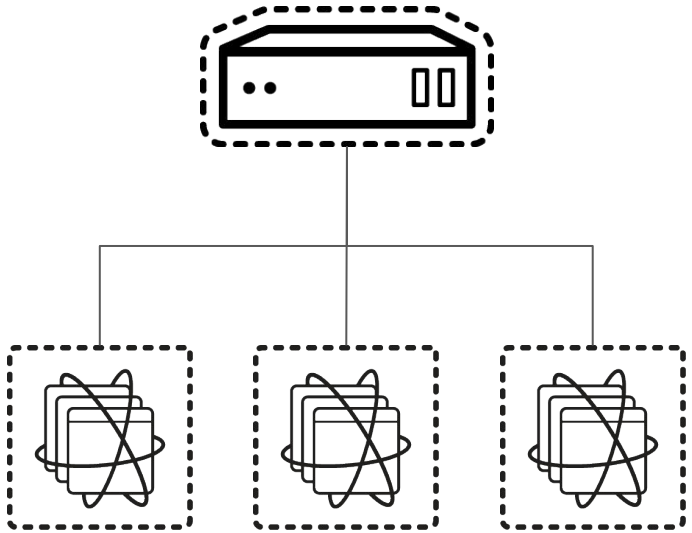
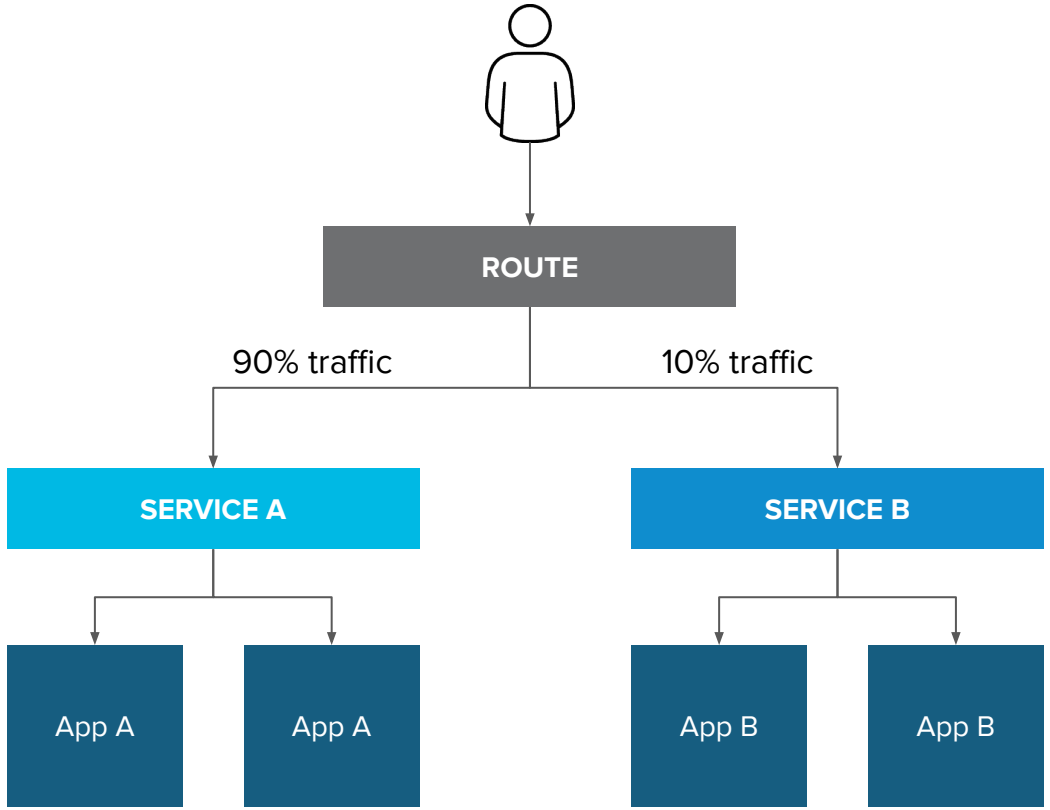
ROUTING AND EXTERNAL LOAD-BALANCING

- Pluggable routing architecture
  - HAProxy Router
  - F5 Router
- Multiple-routers with traffic sharding
- Router supported protocols
  - HTTP/HTTPS
  - WebSockets
  - TLS with SNI
- Non-standard ports via cloud load-balancers, external IP, and NodePort



ROUTE SPLIT TRAFFIC

Split Traffic Between Multiple Services For A/B Testing, Blue/Green and Canary Deployments



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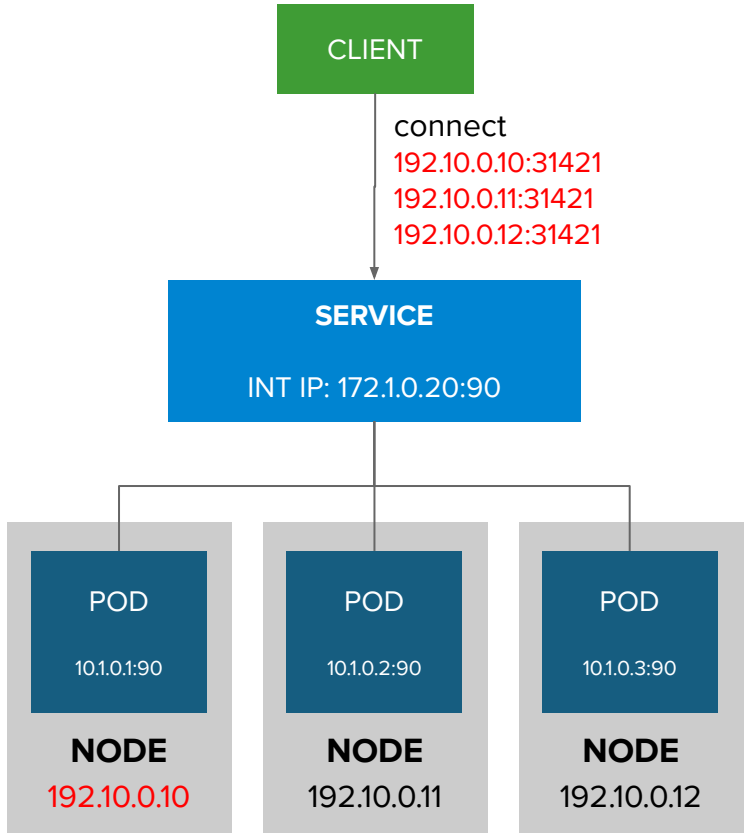
EXTERNAL TRAFFIC TO A SERVICE ON A RANDOM PORT WITH NODEPORT

- NodePort binds a service to a unique port on all the nodes
- Traffic received on any node redirects to a node with the running service
- Ports in 30K-60K range which usually differs from the service
- Firewall rules must allow traffic to all nodes on the specific port



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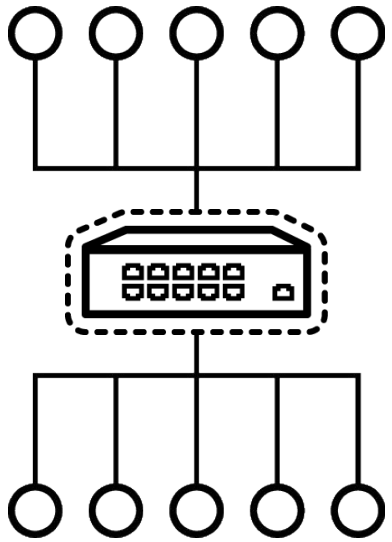
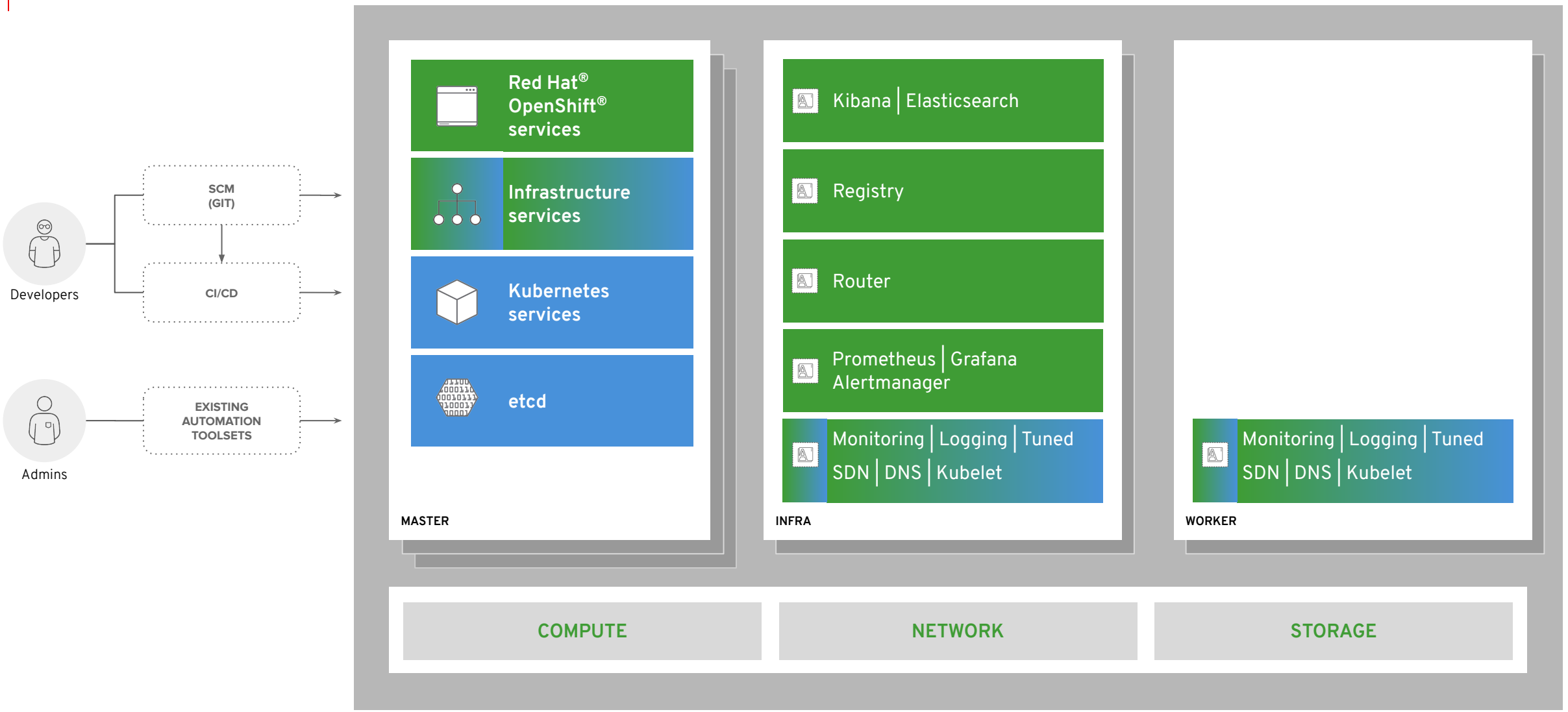
OPENSHIFT NETWORKING

- Built-in internal DNS to reach services by name
- Split DNS is supported via CoreDNS
  - Master answers DNS queries for internal services
  - Other name servers serve the rest of the queries
- Software Defined Networking (SDN) for a unified cluster network to enable pod-to-pod communication
- OpenShift follows the Kubernetes Container Networking Interface (CNI) plug-in model




SCM
(GIT)
CI/CD
Developers
EXISTING
AUTOMATION
TOOLSETS
Admins
Red Hat®
OpenShift®
services
Infrastructure
services
Kubernetes
services
etcd
MASTER
Kibana | Elasticsearch
Registry
Router
Prometheus | Grafana
Alertmanager
Monitoring | Logging | Tuned
SDN | DNS | Kubelet
INFRA
Monitoring | Logging | Tuned
SDN | DNS | Kubelet
WORKER
COMPUTE
NETWORK
STORAGE

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Thank you

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